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STATE OF MONTANA
HIGHWAY DEPARTMENT

A Report

based on

Montana State-wide Highway Planning Survey Data

July, 1940

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D. A. McKINNON, State Highway Engineer

Departmental Publication

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A REPORT

based on

M O N T A N A S T A T E - W I D E H I G H W A Y

P L A N N I N G S U R V E Y D A T A

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Compiled by

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From basic data originating with field and office activities

of the

MONTANA STATE-WIDE HIGHWAY PLANNING SURVEY
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In cooperation with

THE PUBLIC ROADS ADMINISTRATION

of the

FEDERAL WORKS AGENCY

J. F. English and E. D. Kinney, Administration Managers

Released April 1942

FOREWORD

This publication has been compiled with a view toward consolidating the findings of the Montana State-wide Highway Planning Survey. The subject matter may be divided generally into two phases, these being:

1. The inventory of the roads, streets and highways of the State, i.e. what do we have in the line of road facilities and in what manner and to what measure do we use these roads.

2. A forecast of future traffic and related features touching on revenues needed or necessary to build a generally adequate highway system in the future.

Any success attaching to the publication of this report must be attributed to the general industry and zeal of all the personnel of the Planning Survey. The representatives of the Public Roads Administration are to be commended for their cooperative spirit in all phases of the Survey, both in the field and in the office. The writer wishes to acknowledge the good advice and excellent counsel of Messrs. Kinney and English, Administrative Managers, O. J. Jawort, Director and M. J. Steere, Office Engineer of the Montana State-wide Highway Planning Survey.

July, 1940.

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CHAPTER I

PRINCIPLE FUNCTIONS OF THE STATE-WIDE HIGHWAY PLANNING SURVEY AND SUMMARY OF TENTATIVE CONCLUSIONS

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I

PRINCIPAL FUNCTIONS OF THE STATEWIDE HIGHWAY PLANNING SURVEY AND SUMMARY OF TENTATIVE CONCLUSIONS

The Montana Highway Department in cooperation with the Federal Works Agency, Public Roads Administration has been engaged in a fact finding survey relating to the principal phases of highway administration since early in 1936. These studies treat with the physical inventory of the road system in whole, the measure of use of the several systems embodied in the traffic survey and a study of fiscal matters attaching to highway construction and maintenance. Rational development and utilization of these data should lead to a well balanced program of highway development based on a foundation of engineering facts. Previously the highway program has been directed by apparent necessity arising through legislative action, that is to say, the programs of the several county agencies and the Montana Highway Department were laid out to conform with statutory action which attempted to measure the needs of the traveling public. Generally speaking, this method or mode in allocation of improvements has operated to the benefit of all the state residents although the reasons for realizing these "profits"in traffice convenience were not generally known by those engaged in highway work. For example, it was difficult to explain to a resident in the more populous areas the reason for his participation in the construction of a Federal Aid road through a distant less populous county. We now find, as shown in subsequent sections of this report, that the road through the less populous area serves as a very important link in our "through" system and trade and commercial values are enhanced to the mutual advantage of all our state residents. It is to be noted also that the Federal Aid System affords a medium whereby out-of-state residents on tour may enter the state to introduce a source of revenue unthought of in years past. Recapitulating, we find the Planning Survey data sheds new light on the fundamental reasons for the highway industry, why it is necessary and what measures we must take to keep it on a sound and businesslike basis.

1.01 General Objectives and Scope of the Planning Survey

The groundwork in the Planning Survey was distributed among several departments as follows:

1. The Road Inventory
2. The Traffic Survey along with the Road Use Survey.
3. The Financial Survey
4. The Road Life Studies

1.011 Road Inventory

During the course of the field work in the Road Inventory Department a complete listing of the present public road facilities was made showing the width and type of surface; the type, dimension and condition of all major structures such as bridges, overpasses and underpasses: the location of all rural farm units and dwellings, churches, schools, business establishments and other cultural features having influence in the allocation of road improvement; the location of all railroad grade crossings along with data relating to sight distances, approach gradient, surface type and condition. On improved sections of the Federal Aid System numerous data were secured concerning the location and degree of curvature of all sharp curves: the location, extent and rate of rise of all excessively steep grades;and the location and nature of all sight restrictions. All these data were classified as to their incidence by administrative system; accordingly we have information as to the extent of all roads under the control of the Montana Highway Department for example, of the National Forest Service, the Office of Indian Affairs, and the several Boards of County Commissioners.

From the data procured in the field, several series of maps were prepared showing the public road systems and their location with respect to dwellings and major topographical features. With these maps as a base other series have been developed depicting the location and extent of all rural mail routes, school bus routes, etc. In all, these maps represent the first comprehensive attempt to set forth information concerning the extent and direction of the public road system and related cultural features having influence in the genesis of traffic. Samples of these several series of maps are attached as a supplement to this report for the convenience of those interested in the development of the Road Inventory Survey.

The field data were reduced also to table form affording ready access to information concerning the features listed herebefore.

1.012 Traffic Survey — The Traffic Survey was divided into two phases, the field survey whereby data were procured concerning the volume of traffic and the Road Use Survey affording knowledge as to the travel habits of our state residents. In the field work of the Traffic Survey, counts were made at 108 key stations located mainly on the Federal Aid System. These counts were scheduled in such a way as to provide 7 counts in the time interval 6A.M. to 2P.M., 7 counts in the time interval 2P.M. to 10P.M. and from 3 to 4 counts in the time interval 10P.M. to 6A.M. The morning and afternoon counts were separated by a period of six months at each station to effect a mechanical control concerning seasonal changes in the computation of averages. A sub-key circuit comprising 250 stations was established to supplement the survey along the key station circuit. These stations were located generally along those routes which serve the more populous rural areas to build up data whereby detailed information would be procured concerning farm-to-market movements and lesser commercial movements instrumental in the choice of a Secondary System. The sub-key counts were scheduled to afford 2 counts during the period 6A.M. to 2P.M., 2 counts during the period 2P.M. to 10P.M. and 1 count during the period 10P.M. to 6A.M. at certain controlling sub-key stations. The morning and afternoon counts were separated by a time period of 6 months to equalize the effect of seasonal changes in the computation of averages. A so-called "blanket" survey was organized to secure a complete and comprehensive picture of all traffic movements in rural areas. Operations were conducted at approximately 2800 stations, a single count being made at each station during the time period 8A.M. to 4P.M.. These data, when combined with information deriving from counts made at controlling key and sub-key stations represented the first attempt at estimating rural traffic volumes on the Land Service System in relation to traffic on the more heavily traveled routes.

A loadometer weighing circuit, co-extensive with 54 of the key stations was established to procure information, concerning the movements of commercial traffic. By use of portable scales data were secured relating to gross weights on the road, loaded and empty, wheel loads and axle loads. By methods of interview additional information was procured treating with the situs of ownership, commodity hauled, origin and destination of trip, type of vehicle and many other features pertinent in the discussion of commercial vehicle traffic movements.

Weighing operations were conducted at pit scales at DeSmet, Nissler Junction, Rockvale, Miles City and Culbertson. During the course of these operations definitive data were procured concerning the dimensions and type of the hauling units and other features concerning the loading habits of the commercial road user.

Automatic traffic counters were placed in operation in July 1938 at 6 points in the state, 4 on the primary system and 2 on important country roads leading to the primary or Federal Aid System. As a consequence of the operations of these units, we have definite knowledge concerning daily and hourly patterns established by traffic over a comparatively long period of time. These counts are supplemented by a manual count during scheduled intervals to afford data concerning the classification of traffic.

All these field data have been reduced to tabular form and now provide a source of information important and necessary in the preparation of highway transport maps, traffic flow maps and profile maps showing the component vehicles in the traffic picture at large.

In the Road Use Survey, interviewers obtained information respecting the travel habits of our state residents. Data were secured concerning the relative use of the several systems extant by residents in rural areas as compared to residents in urban areas, for example, other data were procured concerning the travel habits of truck owners in contrast to passenger car owners. The results of the survey are set forth in report form in the Road Use Survey report comprising 18 complete tables and two supplementary tables.

1.013 Financial Survey

The Road Inventory Survey and the Traffic Survey afford a primary basis to schedule improvements in the future. No consideration, however, is thus given to fiscal matters attendant on highway construction and administration. Fiscal or financial surveys were instituted to gather material relating to highway finance in relation to finances of other governmental agencies in the state. The first step in solution of the problem was embodied in the motor vehicle allocation study whereby information was afforded concerning the situs of ownership of all motor vehicles, the amount of taxes paid in motor vehicle license taxes and the gas tax by various classes of residents and to a certain extent the travel habits of the various resident classifications.

The fiscal study proper, comprised an analysis of the reports of the several governmental agencies in the State. The analysis leads to information concerning the origin of revenue used in the several functions of the governmental bureaus and commissions and the relationship obtaining in respect to road and street expenditures. The results of the survey are set forth in the report of the Financial Survey comprising 26 complete tables.

1.014 Road Life Studies

Road Life Studies contemplate an analysis of life expectancy of the several road surface types in use. The studies are based on the statistical relationship with respect to survival and retirement of surfaces under use and point the way toward a more systematic procedure in allocation of funds for construction and reconstruction in the interest of a more efficient highway economy. At present the data are incomplete, i.e., the system has not existed for a sufficient time to afford a determinate basis for estimating or anticipating reconstruction needs.

1.02 Summary of Preliminary Conclusions

Preliminary conclusions respecting the findings of the several departments in the Planning Survey are given hereinafter. These points in discussion are given as highlights of the report and data in qualification or substantiation are rendered in more detail in subsequent sections of the report.

A. Extent of the System and Use Thereof

1. This report comprehends four basic road systems in the state, these being the Federal Aid System, the State Secondary System, the Land Service System, and local streets in municipalities. (See Chapter II, Page 2-1 for complete description of the several systems.)

2. There are 65,730.3 miles of road in rural areas comprising the rural Federal Aid System, the rural State Secondary System and the Land Service System of which:

a. 65,682.9 miles carry less than 1,000 vehicles per day.
b. 64,634.6 miles carry less than 500 vehicles per day.
c. 61,410.1 miles carry less than 150 vehicles per day.
d. 57,626.4 miles carry less than 50 vehicles per day.
e. 40,606.2 miles carry less than 10 vehicles per day.

3. The rural Federal Aid System comprising 4680.4 miles of improved highway and 738.6 designated but as yet unimproved miles provide a medium of transport for 64.8% of all traffic on rural roads.

4. The State Seconday System comprising 559.2 miles of improved highway and 2723.6 miles of unimproved highway serves 7.8% of all traffic on rural roads.

5. The Land Service System comprising 57,028.5 miles serves 27.4% of all traffic on rural roads.

6. Four thousand eighty-eight and six-tenths miles of the Federal Aid System presents a bituminous surface or better to serve 61.2% of all traffic on rural highways.

7. One hundred seventy-one and one-tenth miles of the State Secondary System presents a bituminous wearing surface or better to serve 2.1% of all traffic generated on the rural road system.

8. One hundred sixty-six and one-tenth miles of the Land Service System presents a bituminous wearing surface or better to serve 1.8% of all traffic on rural roads.

9. There are 4,425.8 miles of road traversing rural areas which present a bituminous wearing surface or better to serve 64.1% of all traffic on rural roads.

B. Statistics Relating to Surface Widths

1. Of the total improved mileage on the Federal Aid System, 4,680.4 miles, there are:

a. 2,489.9 miles having a surface width of less than 20 feet which serves 31.1% of all traffic on rural roads. Of this total there are but 8.8 miles built to a width considered adequate for the volume of traffic by present day safety standards.

b. 1,779.6 miles having a surface width of 20 or more feet and less than 24 feet which serve 29.2% of all traffic on rural roads. Of this total, 1,184.0 miles are built to width standards not consistent with modern safety requirements, 453.2 miles exist in accord with present day standards and 142.4 miles exist at a width in excess of contemporary safety requirements and probably adequate with respect to future traffic growth.

c. 202.0 miles having a surface width of 24 feet which serve 2.2% of all traffic on rural roads.

d. 208.9 miles having a surface width in excess of 24 feet (mostly graded and drained earth) which serve 1.0% of all traffic on rural roads.

2. Of the Total improved mileage on the State Secondary System, 559.2 miles, there are:

a. 219.5 miles having a surface width of less than 20 feet which serve 1.2% of all traffic on rural roads. Of the total there are but 5.2 miles built to width standards consistent with present day safety requirements.

b. 164.3 miles having a surface width of 20 feet or more and less than 24 feet which serve 1.4% of all traffic on rural roads. Of this total 121.3 miles are built to width standards consistent with modern practice or in excess thereof to accommodate future increased traffic volumes.

c. 159.4 miles having a surface of 24 feet which serve 0.8% of all traffic on all rural roads.

d. 16.0 miles, mostly graded and drained earth, having a roadway width in excess of 24 feet which serve 0.1% of all traffic on rural roads.

C. Statistics Relating to the Incidence of Curvature on the Federal Aid System.

1. There are 1,083 curves on 1,951.7 miles of roadway in the western district of the state of a degree of 14° or more comprising a length of 39.0 miles occurring at a rate of 55 per 100 miles.

2. There are 1,149 curves on 2,728.7 miles in the eastern district of a degree of 6° or more comprising a length of 75.0 miles and occurring at the rate of 42 per 100 miles.

D. Statistics Relating to the Incidence of Sight Restrictions on the Federal Aid System.

1. There are 921 instances whereby clear sights are restricted to less than 325 feet in the western district of the state occurring at the rate of 47 per 100 miles.

2. There are 2,186 instances whereby clear sights are restricted to less than 650 feet and more than 325 feet in the mountainous or western district occurring at the rate of 112 per 100 miles.

3. There are 1,017 instances whereby clear sights are restricted to less than 500 feet in the eastern or plains district, these occurring at the rate of 37 per 100 miles.

4. There are 2,346 instances whereby the clear sight is restricted to less than 1,000 feet and more than 500 feet in the eastern district, these occurring at the rate of 86 per 100 miles.

E. Statistics Relating to Railroad Grade Crossings.

1. There are 1,608 railroad grade crossings in the state, of which 123 are on the Federal Aid System, 37 on the State Secondary System and 1,448 on the Land Service System.

2. Five and eight-tenths percent of the total are served by approach grades of 7% or more.

3. Four and five-tenths percent of the total are protected by neither warning signs nor signals.

4. Ninety-two and one-tenth percent are protected by signs only, one and nine-tenths percent are protected by light or bell signals and 1.5% are protected by moveable wigwag signals.

5. As a class, most crossings are so situated that the shortest clear view from a point on the roadway 300 feet removed is 1,950 feet or more.

F. Relating to Measure of Service of the Several Systems

1. Twenty-eight and nine-tenths percent of all farm units and rural dwellings are located within one mile of the Federal Aid System by travel distances.

2. In western Montana where settlement is restricted to valleys, thirty-eight and five-tenths percent of the rural population in the district is within one mile of the Federal Aid System by travel distance. In eastern Montana where the rural population is distributed over a wide area, twenty-two and nine-tenths percent of the rural population in the district is within one mile of the Federal Aid System by travel distance.

3. The Federal Aid System serves an average of 2.7 rural units per mi.

4. The State Secondary System serves an average of 1.8 rural units per mile.

5. Fifty percent of the total rural population is immediately served by all weather roads.

G. Relating to the Components of Traffic and Travel and Loading Habits Thereof.

1. Passenger cars comprise 79.5% of all traffic on the Federal Aid System, the balance being distributed among trucks, truck and trailer combinations and buses.

2. Passenger cars comprise 78% of all traffic on the State Secondary System.

3. Passenger cars comprise 75.8% of all traffic on the Land Service System.

4. Thirty-three and eight-tenths percent of all loaded light trucks on the Federal Aid System weigh in excess of 10,000 pounds (weight of truck plus payload).

5. Eighty-six and four-tenths percent of all loaded medium trucks on the Federal Aid System weigh in excess of 10,000 pounds (weight of truck plus payload).

6. About 98.4% of all loaded heavy trucks weigh in excess of 10,000 pounds (weight of truck plus payload).

H. Forecasts and Trends

1. Data at hand do not justify any expectation of a great increase in passenger car registration for the next ten or fifteen years. At the present writing there is one passenger car per four and a half persons; the national average is one car per 5.1 persons, which would show Montana to rank among the higher state classifications of vehicle ownership at the present time.

2. In regard to truck ownership the data would indicate possibility of a considerable increase.

3. This department does not anticipate that gas tax revenue will greatly exceed $6,000,000 per year in the next 15 years.

I. Revenues and Expenditures

1. Road and Street bonds outstanding in 1936 totaled $8,863,114. This amount was distributed to the state, county and city agencies in the proportion 33, 50 and 17 respectively.

2. Bond interest and redemption required 6.5% of the total funds expended on highways by the Montana Highway Department.

3. Bond interest and redemption required 35.5% of the total funds expended on highways by the several county administrative agencies.

4. Bond interest and redemption required 24.3% of the total funds expended on highways by the several administrative agencies in municipalities in the state.

5. Revenues originated from levies or grants as follows:

a.	Motor Vehicle License Tax, Gas Tax, etc.	34.1%
b.	Borrowings	7.0%
c.	Federal Aid	36.2%
d.	General Property Tax	21.7%
e.	Miscellaneous	1.0%
		100.0%

J. General

1. In the light of services rendered to the residents of Montana, the Federal Aid System is a profit making endeavor. The Secondary System as proposed will not pay for itself unless placed in combination with the Federal Aid System, thereby distributing the "profits" of the one system to pay for the deficiency of the other. Conversely, there is a tendency to attach "through" traffic characteristics to all movements on the Federal Aid System whereas the findings of the Planning Survey would indicate traffic on the Federal Aid System to be local in characteristic about 80% of the time. The best interests of the people at large would be served if the Federal Aid System were considered as the principal artery in a system devised to serve the greatest number of people within the limit of funds at hand. This proposition contemplates a feeder system leading to the main artery (the Federal Aid System) which would tap the more populous areas now removed from the Federal Aid System and does not comprehend a terminal to terminal designation.

2. Generally speaking, the Federal Aid System exists to satisfy the demands of present day traffic and revenues afforded in the operation of our tax levies are adequate to maintain the system in a state of solvency if we presume no advance in standards of design and construction. There is, however, a seeming public demand for straighter highways, wider surfaces, increased stability in the road structure to sustain heavier loads and other related features in construction affording increased sight distance and safer passing intervals. These items in construction are costly and it is doubtful if the existing tax structure will afford sufficient revenue, now or in the time to come to allow development of the system to standards compatible with the growth of traffic in the future. This apparent deficiency stands out in greater relief when one realizes that the Highway Department is now charged with added responsibility in the development of a secondary system. A rational solution of the problem entails a change in the existing tax structure to afford more revenue for construction and maintenance of the Federal Aid System and the Secondary System.

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II

THE HIGHWAY SYSTEMS

This report contemplates a complete and analytical discussion of all phases of highway administration, particularly those concerning the solvency and use of the entire road system. We endeavor to answer the following questions. Does our road system afford conveniences both social and economic commensurate with its cost? In the light of present day traffic use, is the system adequate, and further, are we building rationally in the interest of future highway sufficiency? As the first step toward solution of these problems we will present the inventory of the roads comprising the entire Montana Road System.

The system comprises the Federal Aid System, the State Secondary System, the Land Service System and streets and alleys in municipalities. Each of these several systems possess individualistic properties which serve to distinguish them one from another. These properties or characteristics result as a circumstance of statutory designation and use or functional service. Further details concerning each of the aforementioned systems are as follows:

(1) The Federal Aid System

The Federal Aid System is the "through" system, of state and national importance, which comprehends a medium of transport affording service to through traffic, i.e., traffic engaged in relatively long trips and industrial or commercial hauling. Designation of a system devised to serve such traffic has resulted in an ordered arrangement of roads which tap all our principal cities along the natural east-west and north-south trade routes in the state. Facilities are thus afforded for movements governed by desire or business necessity to focal industrial cities or areas and points of recreational interest along routes designed to provide directional expediency. The Federal Aid System is intended for traffic service between central cities or areas along the shortest route which topography will permit. These routes follow the principal rivers and streams along which is established the major portion of our population, hence in the ultimate, the Federal Aid System serves as a "feeder" road in addition to its designed function as a "through" system.

Administrative responsibilities incident to the construction and maintenance of the Federal Aid System rest with the Montana Highway Department and the Public Roads Administration. Some few sections traverse areas in the National Forests and Indian Reservations, these being administered by joint action of the Montana Highway Department and Federal Authorities, all funds necessary in the construction of these sections being furnished by the Federal government. On the remainder, the Federal Government participates in the amount of 56% of all construction costs, the state matching these funds with moneys deriving from the levy of a five cent gasoline license tax. Further information respecting the direction and extent of the Federal Aid System may be gained by reference to Plate IV, Section 2.036 of this report, the system being shown by the network of wider bands on the plate.

(2) The State Secondary System

The "feeder" or secondary system of roads tributary to the Federal Aid System is intended principally to serve local residents and farm-to-market traffic. At this writing there is no regularly designated secondary system and this report in discussion conceives the system to be as shown on Plate IV, Section 2.036 as a basis or premise for expansion at a later date. The system, as shown, embodies

improved sections authorized in past emergency relief appropriations and projects originally constructed by the State agencies and existing county roads. In the main, the roads, as set forth for discussion, serve to expedite traffic movements from farm-to-market and directional controls are considered of lesser importance, the principal effort being to provide the greatest public service possible. It is to be emphasized that this system has no basis in statutory action; the system is set up herein to afford a premise in discussion of traffic values on a system tributary to the Federal Aid System. The system is indicative of a network of roads serving relatively large traffic volumes off the primary system, and it is presumed that any specific designation of a secondary system, now or in the future will include a large portion of those roads or routings projected hereinafter for discussion as the State Secondary System.

Chapter X of this report will treat with a system called the County Trunk System similar in use properties, to that system outlined hereinabove as the State Secondary System. This system, approximately 6133 mi. in length, delimits a network of roads, subordinate to the Federal Aid System which we may reasonably expect to be improved within the next twenty-five or thirty years as a secondary system. The two systems should not be confused since the County Trunk System represents an adapted expansion of the State Secondary System described herebefore and additional roads of related characteristic.

Administrative responsibilities in the construction and maintenance of all improved sections of the system devolve upon the Montana Highway Department. Funds have been provided by the Federal Government through the state of construction and the several counties have furnished funds for the maintenance of these sections and have performed such necessary maintenance work as is required.

(3) The Land Service System

The Land Service System is of local interest and of service to local residents comprising all sections of rural roads not previously designated on the Federal Aid System or the State Secondary System in this discussion. These roads serve to facilitate movement incident to operation of local and private industry, principally agriculture. In effect, they comprise the bulk of the mileage in the state and bear low traffic volumes. County agencies are charged with financial and administrative responsibility incident to the operation of the system, funds deriving from the motor vehicle license tax, the general property tax and other general road revenue.

(4) The City Streets and Alleys

The city streets are of interest and of service principally to urban residents and comprise all sections of the designated Federal Aid System in municipalities and urban extensions of the State Secondary System described herebefore and local streets and alleys. Municipal agencies are charged with responsibilities incident to the operation of the system, funds deriving principally from a general property tax.

These several systems are discussed hereafter in greater detail in Sections 2.03, 2.04, 2.05 and 2.06 of this report.

In addition to these several categorical designations, we can classify the highway plant in terms of its location, rural or urban, discussion of which follows immediately hereafter.

2.01--Rural Public Roads

Rural public roads comprise sections of the Federal Aid System, the State Secondary System and Land Service System outside of municipalities. Table 1 following presents data with regard to length and surface type of the rural public roads system.

Table I

INVENTORY OF ALL RURAL PUBLIC ROADS CLASSIFIED BY SURFACE TYPE

AND SYSTEM DESIGNATION

System Designation	Type of Improvement 2/	Surface Types 1/												Grand Total
		Concrete	Bituminous Macadam	High Type Bit.	Sub-Total Paved	Low Type Bit.	Plain Macadam	Plain Gravel	Sub-Total Surfaced	Graded & Drained	Unimproved	Primitive	Sub-Total Unsurfaced	
Federal	1	25.1	2.9	1363.0	1391.0	2697.6	332.9	66.3	3096.8	192.6			192.6	4680.4
Aid	2						41.3	126.7	168.0	22.5	491.7	56.4	570.6	738.6
System	3	25.1	2.9	1363.0	1391.0	2697.6	374.2	193.0	3264.8	215.1	491.7	56.4	763.2	5419.0
State	1	3.3		64.4	67.7	103.4	339.6	48.5	491.5					559.2
Secondary	2						158.8	523.9	682.7	176.3	1807.2	57.4	2040.9	2723.6
System	3	3.3		64.4	67.7	103.4	498.4	572.4	1174.2	176.3	1807.2	57.4	2040.9	3282.8
Land	1	2.0		3.1	5.1	161.0		14.7	175.7					180.8
Service	2						1043.5	3559.4	4602.9	2998.5	28716.3	20530.0	52244.8	56847.7
System	3	2.0		3.1	5.1	161.0	1043.5	3574.1	4778.6	2998.5	28716.3	20530.0	52244.8	57028.5
All	1	30.4	2.9	1430.5	1463.8	2962.0	672.5	129.5	3764.0	192.6			192.6	5420.4
Rural	2						1243.6	4210.0	5453.6	3197.3	31015.2	20643.8	54856.3	60309.9
Roads	3	30.4	2.9 3/	1430.5	1463.8 4/	2962.0 5/	1916.1 6/	4339.5 7/	9217.6	3389.9	31015.2 8/	20643.8	55048.9	65730.3

/ Surface Type - Classification by wearing course.
Concrete - Portland Cement Concrete Paving
Bituminous Macadam - A high type paving, involving the use of graded aggregated (crushed rock) and a heavy aspheltic binder.
High Type Bituminous Paving - A high type paving involving the use of graded aggregates and an aspheltic road oil, the depth of the treatment being 2½ inches or more.
Low Type Bituminous Paving - Similar to above but built to a depth of less than 2½ inches.
Plain Macadam - Crushed gravel surfacing.
Plain Gravel - Pitrun gravel surfacing, not crushed.
Graded & Drained - A road which has no transported or prepared surfacing material in place as a wearing surface, the earth, sand, clay et cetera, in place serving therefor. These roads are usually constructed to a relatively higher standard than unimproved and primitive roads which follow in the definitions.
Unimproved - A road which comes into being as a circumstance of the expenditure of public funds but which has no great uniformity as regards alignment, installation of drainage structures, grades, surfacing, etc.
Primitive Roads - Trails: a road which comes into being as a circumstance of use principally.

/ Type of Improvement -
-1- Generally indicative of work done by the Montana Highway Department or the Public Roads Administration. This work was performed under strict engineering control manifest in the usual "Standard Specifications for Road and Bridge Construction".

-2- Generally indicative of work done by other agencies than the State Highway Department or the Public Roads Administration. Usually this work is performed with little or no engineering supervision consequently there is no great uniformity with respect to alignment, grades, culvert construction, surfacing etc.

-3- Composite, all roads improved as in (1) or otherwise in (2).

3/ This mileage listed as "Block other than brick" in Road Inventory Survey Tables.

4/ Total "Paved" mileage in Road Inventory Survey Tables listed at 1466.4 which includes 2.6 miles of scoria surfaced mileage at Rosebud County (WPSO 362). This report lists this mileage (2.6 miles) with "Plain Gravel" surfacing.

5/ The Road Inventory Survey Tables list the total mileage of low type bituminous surfacing at 2965.7 miles. The tables list 10.9 miles in Richland County (NRS 327 and WPSO 361A & B) as low type bituminous surfacing whereas this report lists this mileage as plain macadam surfacing. Also, the Road Inventory Tables list 7.2 miles in Silver Bow County (NRS 285A & WPSO 364) as plain macadam whereas this report lists this mileage as low type bituminous surfacing to effect a total net decrease of 3.7 miles (10.9 - 7.2).

6/ The Road Inventory Tables list the total mileage of plain macadam surfacing as 1906.5 miles. This report, on reclassification of surface type in Wibaux County (5.9 miles) and adjustments set forth in 3/ lists the total plain macadam at 1916.1 miles. Net increase 9.6 miles (5.9 + 3.7).

7/ The Road Inventory Tables list 4342.2 miles of plain gravel surfacing. This report shows 4339.5 miles of plain gravel surfacing, an apparent decrease of 2.7 miles, involving a reclassification of scoria surfacing in Rosebud County (+2.6 miles) and a reclassification of surfacing in Ravalli County (-5.3 miles).

8/ This Report lists 0.4 miles less unimproved mileage than does the Road Inventory Tables as circumstance of minor adjustments at city limit lines, etc.

2.02--City Streets & Alleys

City streets comprise sections of the Federal Aid System in urban areas, urban extensions of the State Secondary System and local streets and alleys. Table 2 sets forth details with respect to system designation and surface types.

Table 2
INVENTORY OF THE CITY STREETS CLASSIFIED BY SYSTEM DESIGNATION AND SURFACE TYPE

System Designation	Surface Types			Grand Total
	Paved	Surfaced	Unsurfaced	
	Miles	Miles	Miles	Miles
Federal Aid System	117.6	11.4	6.0	135.0
State Secondary System	12.1	12.8	6.4	31.3
Local Streets & Alleys	396.8	370.2	1266.4	2033.4
TOTALS	526.5	394.4	1278.8	2199.7

Local Streets 1506.9 miles, Alleys 526.5 miles.

The total road mileage in the state, rural and urban, aggregates 67,930.0 miles. Further discussion with respect to each of the designated systems follows immediately hereafter.

2.03--The Rural Federal Aid System

The term "State Highway System" as generally used in connection with the Federal Aid System, is based upon the standard to which it is constructed. To those who are occupied with the construction and maintenance of the system, the term applies only to those sections which are improved to standards acceptable to the Montana Highway Department and its cooperating body, the Public Roads Administration. Contrary to this viewpoint, this report will discuss the system as an entity to include those sections now unimproved but serving as a medium of highway transport along the designated Federal Aid or Seven Percent System.

2.031--History of the Designation and Growth of the Federal Aid System

A rational discussion of the system entails not only a history of its designation and growth, but also a review of the activities of the principal administrative agencies, namely, the Montana Highway Department and the Public Roads Administration. Furthermore, it is of utmost importance to establish the necessity of the state system as a component of the national system. This can be done if we show why Federal Aid is justly due the people of Montana. Among other reasons, Federal Aid is due our state as a circumstance of our present accepted system of Federal taxation, where, on the one hand, our people are levied upon by the Federal government and, on the other hand, the Federal government owns national reservations within the state which are not taxable by state and county divisions of our local governing agencies. The first Federal Aid Road Act recognized the importance of the system as a medium for the transportation of mail in that it provided that the "United States shall aid the States in the construction of rural post roads." The particular convenience of mail delivery is, of course, of direct benefit to our citizens. However, the fact remains that mail delivery is a function of the national government and any roads or systems built by the state and used by the Federal government should merit a consideration, small enough it is true, but tangible nevertheless, since the people of Montana along with those of other states pay toward the administration of the Post Office Department through collections for services rendered.

In the administration of National Reservations, Federal authorities use the roads of our system as a medium of highway transport in the prosecution of their duties. The Federal Government levies motor vehicle imposts upon our people and if we are to receive direct benefits for such imposts, surely the money should be returned to us as Federal road funds. Lastly, our state along with others lies on trade and recreational routes, hence the system is of national interest from the standpoint of interstate commerce and usage. These reasons why Federal Aid should come to our state are

drawn out in some detail to bring forth the idea that Federal Aid is not particularly a grant in the commonly accepted version of the term. In actuality Federal Aid is justly due to people of Montana as citizens of the United States, and our citizens, as taxpayers, will ultimately pay for Federal Aid in every sense of the word.

All Federal Aid Road Acts have recognized the national importance of the separate state systems and further, have specified that each state should have a definite administrative body in control of the construction and maintenance of the Federal Aid System, hence the reason for the establishment of our present form of road governance, namely, the Highway Commission. Prior to the enactment of the first Federal Aid Road Act, that of 1916, the state participated as a highway improvement unit beginning with the formation of a State Highway Commission in 1913. This body acted in a consulting capacity for the several Boards of County Commissioners directing their work along the then recognized standards of road and bridge construction. Funds for this administrative work were derived from the motor vehicle registration law then in effect.

Under the terms of Chapter 170 of the Session Laws of 1917 the Commission was reorganized. Its principal function was that of a procurement division, the several Boards of County Commissioners recommending certain roads for improvement and the Commission in turn surveyed and designed those deemed consistent with the provisions of the Federal Aid Road Act of 1916. Funds for the administration of this work derived from the Motor Vehicle License Fees (Chapter 75 of the Session Laws of 1917). The Act was administered by the Secretary of State, who, after paying the cost of administration, returned one-fourth of the balance to the counties of origin and three-fourths was then paid into the State Highway Fund. Of this amount, the Highway Commission set aside one-third to be expended under its direction in the counties in which the fund originated. The balance of one-half the net amount was set aside for the general expense of the Commission.

Since the Federal Aid Road Act of 1916 did not specify construction work along any system other than that implied in the term "rural post road", there was, strictly speaking, no progress on our Federal Aid System as we speak of it now. The system as set up at that time, existed chiefly as a pattern of inter-county roads with ultimate completion being directed toward a system approximating that now followed by our present principal main routes.

The original Federal Aid Road Act of 1916 was amended in 1919 to provide additional funds through June 30, 1922. Under the terms of the original act and the amendment, the Commission, in cooperation with the counties, built a number of projects, most of which were incorporated in the Federal Aid System under the terms of the Federal Aid Road Act of 1921.

Under Chapter 10 of the Acts of the Extraordinary Session of the Seventeenth Legislative Assembly, the Commission was reorganized and, under the provisions of the Federal Aid Road Act of 1921, this body initiated the first step toward an integrated Federal Aid System as it now exists. Before proceeding to the detailed history of the designation of the system, it is well to give the general sense of the Federal Highway Acts. All Federal Highway Legislation has offered benefits consistent with the following basic provisions.

(1) Federal Aid is made available to the states as administrative units rather than to minor subdivisions thereof.

(2) As a corollary of the above, each state must have a department specifically charged with the responsibility for the expenditure of Federal funds.

(3) The Public Roads Administration is charged with the responsibility of administering Federal Aid for the Federal government and deals exclusively with the several state highway departments.

(4) The states must contribute to the cost of the projects built with participating Federal funds.

(5) The amount of Federal money that can be applied to any construction is limited.

(6) All Federal Aid projects are initiated and prosecuted by the State Highway Department, which makes all surveys and plans, lets contracts for and supervises and inspects all construction work, and receives and disburses all Federal funds within the state.

(7) The Public Roads Administration must approve all routings, plans, methof financing, and construction work.

(8) Federal monies may be received during the progress of work and final payment is made by the Public Roads Administration to the State Highway Department after the project is completed and approved by all administering agencies.

(9) A limited time is provided for the matching of Federal funds allocated to the states and if not matched or obligated within the time specified, the unmatched Federal money returns to the Federal government and may be reallotted to other states.

Special provisions of the Acts, of particular interest and upon which our present system was predicated, are as follows:

The application of Federal roads funds is restricted to a system of highways in each state, which system may contain not to exceed 7% of the total road mileage of the state according to the Federal Highway Act. However, subsequent legislation in the Emergency Relief and Construction Act of 1932 permitted this 7% or Federal Aid System to be increased in 1% increments of the total certified mileage when 90% of the Federal Aid System has been completed and maintenance assured.

Under the provisions of the Act the Federal government participates in an amount not to exceed 50% of the cost of highway construction work plus a percentage of such estimated cost equal to one-half of the percentage which the area of the unappropriated lands in the state bears to the total area of the state. In effect the United States pays about 56% of the cost of highway construction work on that part of the system administered in whole by the Montana Highway Department.

On the premise thus established, the Secretary of Agriculture approved on October 9, 1922 upon the recommendation of the Highway Commission, the following routes aggregating approximately 4,366 miles:

Route No.	Description
(1)	The present route followed by US #2.
(2)	The route now followed by US #10 from the Idaho line to Miles City, thence via US #12 to the North Dakota line.
(3)	The Route now followed by US #91 from the Idaho line to Vaughn via Great Falls, thence to the Browning Wye along the route now followed by US #89, thence along mileage coinciding with the present US #2 to the junction 13 miles west of Browning, thence along the route now followed by US #89 to the Canadian line.
(4)	The present route followed by US #310 from the Wyoming line to Laurel.
(5)	The route followed from DeSmet junction to Kalispell by US #93.
(6)	The route now followed by Montana 3 from Ravalli to the Idaho line.
(7)	The route now followed by US #93 from Missoula to the Idaho line.
(8)	The route now followed by US #10 from Garrison to the Three Forks junction.
(9)	The route now followed by Montana #33 from Wolf Creek to Choteau.
(10)	The route now followed by Montana #29 from Great Falls to Havre.
(11)	The route now followed by US #87-89 from Great Falls to Armington, thence by way of the route now followed by US #89 to the Yellowstone Park line at Gardiner.
(12)	The route now followed by US #191 from the Yellowstone Park line at West Yellowstone westerly to the Idaho line.
(13)	From the Idaho line at Reynolds Pass to a point probably near Lyon, thence by way of the route now followed by Montana #1 to the Sappington junction with US #10.
(14)	The route now followed by Montana #6 from Townsend to Roundup.
(15)	The route now followed by US #87 from Armington to Grass Range, thence by way of the present Montana #18 to the junction west of Glendive, thence by

way of US #10 to the North Dakota line.

(16) The present traveled way of US #87 from Grass Range to the junction north of Billings, thence by way of the route now followed by US #10 to Billings, thence by way of the route now followed by US #87 to the Wyoming line.

(17) The present route of US #10 from Miles City to the junction with Montana 18 West of Glendive.

(18) The present route along Montana 22 from Miles City to Jordan.

(19) The present route along US #10S from Crackerville to Philipsburg.

Under date of September 27, 1923 the Secretary of Agriculture advised that the mileage of the system was more properly 3,983 miles and approved the addition of the following routes which, with the addition of the first 19 routes, aggregated 4,122 miles.

Route No.	Description
(20)	The route now followed by Montana #14 from Glendive via Sidney to Fairview.
(21)	The route now followed by US #91 from Vaughn to Shelby.

By letter of May 3, 1924, the Secretary approved modifications as follows:

Federal Aid Route No. 5 was extended to follow the present US #93 to the Canadian line.

Federal Aid Route No. 19 was extended to follow the present US #10S from Philipsburg to Drummond.

Federal Aid Route No. 21 was extended to follow the present US #91 from Shelby to the Canadian line.

Route No.	Description
(22)	Route No. 22 was added to follow the present Montana 16 from Culbertson to Plentywood, thence by way of the route now followed by Montana 5 to Scobey.

The total mileage then embraced in the system was set tentatively at 4,366 miles. By letter of May 8, 1926 the Secretary approved the addition of two more routes, the total mileage being set tentatively at 4,661 miles.

Route No.	Description
(23)	The route now followed by Montana 22 from Miles City to Alzada.
(24)	The route now followed by Montana 20 from Bonner to Lincoln, thence to Augusta, thence along the route now followed by Montana #20 to Lange's Corner.
(23)	Under date of May 12, 1927, the Secretary approved the extension of the F.A. route No. 23 to the Wyoming line with four miles being then added to the system.

Under date of March 26, 1928 the Secretary approved the addition of the following route, the mileage embraced in the system increasing to 4,673.5 miles.

Route No.	Description
(25)	From a connection with Route No. 1 at or near Wolf Point to the south line of Section 33, T. 27 N.R. 48 E., M.M. enroute to Circle.

In accordance with the provision of Section 3 of the Amendatory Act of May 21, 1928 (45 Stat. 683) which stated in essence that the Seven Percent System may be exceeded by the mileage of roads on the said system within National Forest, Indian, or other Federal reservations within the State, the Secretary approved the addition of 769.82 miles to the system under date of March 14, 1928.

Route No.	Description
(13)	N.B. Under date of August 6, 1929, the Secretary approved the modification of F. A. Route 13 whereby it would originate at West Yellowstone, thence by way of the present Montana No. 1 to its junction with US #10 at Sappington.

By so modifying the description, the system mileage was decreased to 3,889.68 mi. exclusive of that mileage lying within Federal Reservations.

Under date of March 6, 1930, the Secretary approved the inclusion of the following route. The mileage in the system was set at 3,899.68 miles exclusive of the 800.82 miles of the system lying within Federal Reservation.

Route No.	Description
(26)	The present route followed by Montana 23 from a point south of Sidney to the North Dakota line.

Under date of May 6, 1930 the Secretary approved modifications and additions as follows:

Route No.	Description
(14)	Federal Aid Route No. 14 was extended to a terminal at Forsyth to follow the present Montana 6.
(25)	Federal Aid Route No. 25 was extended to a terminal at Circle.
(27)	Federal Aid Route No. 27 was added to follow the present Montana 7 from Baker to Ekalaka.
(28)	Federal Aid Route No. 28 was added to follow the present Montana 32 from Rockvale to Red Lodge.
(29)	Federal Aid Route No. 29 was added to follow the present Montana 34 from Ennis to Virginia City.
(30)	Federal Aid Route No. 30 was added to follow the present Montana 5 from Plentywood to the North Dakota line near Westby.

These modifications and additions increased the mileage on the system to approximately 4,162.88 miles exclusive of the 800.82 miles on the system lying within Federal Reservations.

Under date of June 7, 1930 the Secretary approved additions to the system as follows:

Route No.	Description
(31)	The present route followed by Montana 13 from Flaxville to the Canadian line.
(32)	The present route followed by Montana 13 from Scobey to the connection with US #2 east of Wolf Point.
(33)	The present route followed by Montana 37 from Libby to a connection with US #93 near Eureka.
(34)	The present route followed by Montana 26 from Manicke to a connection, with Montana 3, near Trout Creek.

With these additions the system aggregated approximately 4,243.68 miles exclusive of the 864.32 miles then lying within Federal Reservations.

Under date of November 12, 1931 the Secretary approved corrections and addition to the system as follows:

Route No.	Description
(22)	Federal Aid Route No. 22 was extended to follow the present Montana 16, from Culbertson to Sidney.
(35)	Federal Aid Route No. 35 was added to the system to follow generally the present Montana 38 from Grantsdale to a junction with US #10 S near Georgetown Lake.

The total length of the system as of the date was set tentatively at 4,317.28 mi. exclusive of 920.92 miles then lying within Federal Reservations.

Under date of December 13, 1932 the Secretary approved an addition to the systems as follows:

Route No.	Description
(36)	Federal Aid Route No. 36 to follow the present Montana 28 from Plains to Elmo including a spur to Hot Springs. By virtue of the addition the system mileage was increased from 4,325.58 miles, exclusive of 964.62 miles in the system lying within Federal Reservations.

Under date of February 27, 1933 the Secretary approved an addition to the system as follows:

Route No.	Description
(37)	Federal Aid Route No. 37 to follow the present Montana 8 from a point near Olive to Crow Agency.

Mileage on the system was increased to approximately 4,347.58 miles exclusive of 1,052.62 miles then lying on the system within Federal Reservations.

Under date of May 9, 1933 the Secretary approved an addition to the system as follows:

Route No.	Description
(38)	Federal Aid Route No. 38 to follow the present traveled way between a point on US93 south of Whitefish to a point on US2 east of Columbia Falls.

By virtue of the additions, the system was increased to 4,356.08 miles exclusive of 1,052.62 lying on the system within Federal Reservations.

Under date of July 13, 1933 the Secretary approved an addition to the system as follows:

Route No.	Description
(39)	From a point on the Federal Aid Road (US89) at or near Babb via Kennedy Creek to a point on the International Boundary enroute to Waterton Park. Canada.

By virtue of the addition the mileage in the system lying within Federal Reservations was increased to 1,069.12 miles and the mileage of the system exclusive of that on Federal Reservations remained unchanged at 4,356.08 miles.

Under date of October 13, 1933 the Secretary approved an addition as follows:

Route No.	Description
(40)	Federal Aid Route No. 40 from a point on Federal Aid Route No. 10 (Mont. 29) north of the Missouri River Bridge (Tenth Street) to a point on the Federal Aid road (US87-89) west of the Missouri River (Central Avenue) in Great Falls.
(41)	From a point on Federal Aid Route No. 11 near the southwest quarter of Section 11, Township 20N. Range 4E. westerly and inside the corporation line of the city of Great Falls to the Great Northern Crossing thence northerly along the east side of the Missouri River to a junction with Federal Aid Route 10 near the junction of Ninth Avenue and Fifth street extended.

These additions brought the total mileage of the system to approximately 4,365.58 miles exclusive of 1,069.12 miles lying within Federal Reservations.

Under date of November 29, 1933 the Secretary approved an addition to the system as follows:

Route No.	Description
(42)	Federal Aid Route No. 42 to follow the present Montana 22 to the Fort Peck Dam, thence by non-existent mileage to a point on Montana 18 at or near Van Norman.

With the additions the mileage on the system aggregated 4,440.58 miles exclusive of 1,069.12 miles lying within Federal Reservations.

Under date of December 18, 1934 the Secretary approved the following corrections and additions:

Route No.	Description
(16)	Federal Aid Route No. 16 was extended to a terminal on US2 between Malta and Dodson.
(25)	Federal Aid Route No. 25 was re-described to provide a general rather than specific terminal at Circle.
(43)	Route No. 43 was added to follow a routing from Lewistown via Roy to a junction with the Federal Aid Road between Grass Range and the Wilder Crossing of the Missouri River.

These revisions and additions increased the mileage on the system to approximately 4,604.58 miles exclusive of 1,069.12 miles lying within the Federal Reservations.

Under date of March 27, 1935 the Secretary approved the following revisions:

Route No.	Description
(29)	Federal Aid Route No. 29 was extended to follow the present Montana 34 from Virginia City to Twin Bridges, thence by way of the present Montana 41 to a junction with US10 west of Whitehall.

By virtue of the revision the mileage on the system was increased to approximately 4,656.78 miles exclusive of 1,069.12 miles on the system lying within Federal Reservations.

Under date of December 13, 1935 the Secretary approved a spur addition to Federal Aid Route No. 1 at Belton to extend northerly to the south boundary of Glacier National Park. By virtue of the addition, the system not lying within Federal Reservation remained unchanged, however, the mileage on the system lying within Federal Reservations was increased to 1,069.40 miles.

Under date of August 7, 1936 the Secretary approved an addition to the system as follows:

Route No.	Description
(44)	Federal Aid Route No. 44 to extend from a point on Federal Aid Route No.1 (US2) approximately 1 mile south of Browning to a point on the same Federal Aid road (US2) at Glacier Park Station.

This addition increased the mileage in the system lying within Federal Reservations by approximately 12.5 miles while that lying without the Federal Reservations remained unchanged.

Under date of May 16, 1938 the Secretary approved revisions in the route descriptions for the entire Seven Percent System (Routes 1 through 44). Due to recent and more accurate determinations and the inclusion of those parts and extension of Federal Aid Routes formerly ineligible for Federal Aid within municipalities of 2,500 or more population, but now made eligible by statute for inclusion, the mileage of the system as approved is found to be 4,390.00 miles, exclusive of 1,057.79 miles within Federal Reservations.

The system as approved for the period of this report is then as follows:

TABLE 3
Montana Federal Aid System

ute No.	Description	Gross Mileage
1	From the Montana-Idaho State line near Leonia, Idaho, via Troy, Libby, Manicke, Kalispell, Belton, Glacier Park, Browning, Cut Bank, Shelby, Chester, Havre, Chinook, Malte, Glasgow, Wolf Point and Culbertson to the Montene-North Dakote State line east of Bainville enroute to Williston, North Dakota with a spur from e point et Belton, northerly to the south boundary of Glacier Nationel Park. (1)	692.213
2	From the Montana-Idaho State line et Lookout Pess vie St. Regis, Superior, Missoula, Bonner, Drummond, and Garrison Deer Lodge, Butte, Whitehall, Three Forks, Bozeman, Livingston, Big Timber, Columbus, Laurel, Billings, Hysham, Forsyth, Miles City and Baker to the Montana-North Dekota Stateline easterly of Baker enroute to Bowman, North Dakota.	714.776
3	From the Montana-Idaho State line at Monida Pass via Monida and Dillon to a point on Federal Aid Route No. 2 west of Butte and from another point on Federel Aid Route No.2 in Butte via Boulder, Helone, Wolf Creek, Great Falls, Vaughn, e point northeast of Sun River end Chouteeu to a point on Federal Aid Route No. 1 southeast of Browning end from another point northeast of Federal Aid Route No.1 north of Glacier Park Station via Babb to the Internetionel Boundary north of Babb enroute to Cerdston, Alberta, Canada. (1)	449.660
4	From e point on Federal Aid Route No. 2 in Leurel via Rockvele, and Bridger to the Montana-Wyoming Stete line north of Frannie, Wyoming.	55.113
5	From e junction with Federal Aid Route No. 2 northwest of Missoula vie Ravalli, Polson, Elmo, Kalispell, Whitefish and Eureka to the International Boundary south of Rooseville, Canada. (1)	189.157
6	From e point on Federel Aid Route No. 5 in Revelli vie Plains, Thompson Falls, and Trout Creek to the Montana-Ideho line northwest of Heron.	117.106
7	From e point on Federel Aid Route No. 2 in Missoule via Lolo and Hemilton, to the Montana-Idaho Stete Line et Gibbons Pess.	94.475
8	From a point on Federal Aid Route No. 2 neer Gerrison to a point on Federel Aid Route No. 3 in Holene and from another point on Federel Aid Route No. 3 in Helene vie Townsend to a point on Federal Aid Route No. 2 west of Three Forks.	107.813
9	From e point on Federal Aid Route No.3 at Wolf Creek vie Auguste to a point on Federal Aid Route No. 3 et Chouteau.	67.530
10	From e point on Federal Aid Route No.3 in Great Falls via Fort Benton to e point on Federel Aid Route No. 1 in Havre.	114.796
11	From a point on Federel Aid Route No. 10 in Great Falls vie Armington and White Sulphur Springs to a point on Federal Aid Route No.2 east of Livingston and from another point on Federel Aid Route No.2 in Livingston to the Yellowstone National Park Boundery at Gardiner. (2)	230.106
12	From the Yellowstone National Park Boundary at West Yellowstone to the Montana-Idaho line at Targhee Pass.	9.776
13	From a point on Federal Aid Route No.12 at West Yellowstone via Ennis to a point on Fadaral Aid Route No. 2 neer Sappington.	106.451
14	From a point on Federal Aid Route No. 8 et Townsend to a point on Federal Aid Route No. 11 south of White Sulphur Springs and from another point on Federal Aid Route No. 11 northeast of White Sulphur Springs via Harlowton, Ryegate and Roundup to a junction with Fadaral Aid Route No. 2 et Forsyth.	260.706
15	From a junction with Federal Aid Route No. 11 near Armington via Stanford, Lewistown, a point near Gress Range, Jordan, Circle, Glendive, and Wibeux to the Montana North Dakota Stete line near Baech, North Dakota.	365.908
16	From a point on Fedaral Aid Route No.1 in Malta via Wildar Crossing of the Missouri River and Grass Range to a point on Faderal Aid Route No. 14 in Roundup, and from another point on Fedaral Aid Routa No.14 southwest of Roundup to a point on Federal Aid Route No. 2 north of Billings and from another point on Federal Aid Route No.2 at Billings vie Hardin and Crow Agency to the Montana-Wyoming Stata line north of Parkman, Wyoming.	299.375
17	From a junction with Federel Aid Route No. 2 near Miles City via Terry to a point on Federal Aid Routa No. 15 west of Glendive.	76.190
18	From a point on Federal Aid Route No. 15 neer Jordan to a point on Federal Aid Route No. 2 in Miles City.	83.627
19	From a junction with Federal Aid Routa No. 2 southeast of Anaconda, via Anaconda, Georgetown Lake, and Philipsburg to a point on Federal Aid Route No. 2 in Drummond.	66.528
20	From a point on Federal Aid Route No. 15 near Glendive vie Sidney to the Montana-North Dekota Steta line at Fairview.	63.966
21	From a point on Federal Aid Route No. 3 at Vaughn via Conrad to a point on Federal Aid Route No. 1 et Shelby, and from another point on Federal Aid Routa No. 1 in Shelby to the International Boundery at Sweet Grass.	111.484
22	From the beginning of Federel Aid Route No.32 in Scobey, via Flaxville and Plentywood to a point on Federal Aid Routa No. 1 in Culbertson and from another point on Federel Aid Route No.1 in Culbertson to a point on Federel Aid Route No. 13 in Sidney.	126.529
23	From a point on Federal Aid Routa No. 2 in Miles City via Broadus to the Montana-Wyoming State line neer Alzade.	139.887
24	From a point on Federal Aid Route No.2 at Bonner, via Ovanda and Lincoln to a point on Federel Aid Route No. 9 northwest of Wolf Creek and from another point on Federel Aid Route No.9 Neer Augusta via Sun River to a junction with Federel Aid Route No.3 northeast of Sun River Corner.	141.809
25	From a point on Federal Aid Route No.1 in Wolf Point to a junction with Federal Aid Route No. 15 at Circle. (1)	52.900
26	From a point on Federal Aid Route No.20 south of Sidney easterly to the Montana-North Dakota State line.	7.643
27	From e point on Federel Aid Route No.2 in Baker to Ekalaka.	40.321
28	From e point on Federal Aid Route No. 4 at Rockvele via Red Lodge to a point within the east boundary of Custer National Forest approximately nine miles southwest of Red Lodge.	41.764
29	From e point on Federal Aid Route No. 13 at Ennis via Virginia City, Sheridan and Twin Bridges to a point on Federel Aid Route No. 2 westerly of Whitehall.	65.532
30	From e point on Federal Aid Route No. 22 neer Plentywood to the Montana-North Dekota line at Westby.	24.214
31	From a point on Federel Aid Route No. 22 et Flaxville via Whitetail to the International Boundary north of Whitetail enroute to Bengough, Saskatchewan, Canade.	13.805
32	From the beginning of Federal Aid Route No.22 in Scobey to a point on Federel Aid Route No.25 east of Wolf Point.	51.307
33	From a point on Federel Aid Route No. 5 near Eureka via Rexford to e point on Federal Aid Route No.1 in Libby.	67.272
34	From a point on Federal Aid Route No. 1 near Manicke to a point on Federel Aid Route No. 6 near Trout Creek. (3)	27.300
35	From a point on Federal Aid Route No.7 south of Hamilton to a point on Federel Aid Route No. 19 near Georgetown Lake.	57.855
36	From e point on Federal Aid Route No.6 near Plains to a point on Federel Aid Route No.5 near Elmo with a spur to Hot Springs. (1)	48.384
37	From e point on Federal Aid Route No.16 near Grow Agency via Lame Deer and Ashland to a point on Federel Aid Route No. 23 near Broedus.	104.273
38	From a point on Federel Aid Route No. 6 south of Whitefish to a point on Federal Aid Route No. 1 east of Columbia Falls.	2.028
39	From a point on Federel Aid Route No. 3 north of Babb via Kennedy Creek to the Internetional Boundery enroute to Waterton Park, Canada.	14.281
40	From a point on Federal Aid Route No. 10 in Great Falls north of tha Missouri River Bridge at Tenth Straet to another point on Federal Aid Routa No. 10 west of the Missouri Rivar Bridge et Centrel Avenue in Great Falls.	2.028
41	From a point on Federel Aid Route No. 11 east of Great Falls wastarly to e crossing of tha Graat Northarn Reilwey in Groet Falls and thenca northerly along the east bank of tha Missouri Rivar in Greet Falls to a point on Federal Aid Routa No. 10 approximately at the intersaction of Ninth Avenua and Fifth Streat extended.	7.542
42	From e point on Federel Aid Route No. 1 in Glesgow via Fort Peck Dam to e point on Faderal Aid Route No.15 naer Van Norman.	75.206
43	From a point on Federal Aid Route No. 15 in Lawistown via Roy to a junction with Faderal Aid Route No. 16 batwean Grass Range and the Wildar Crossing of tha Missouri Rivar.	44.708
44	From e junction with Faderel Aid Route No.1 approximately one mile south of Browning to a point on Federel Aid Route No. 1 at Glacier Perk Station.	12.511
TOTAL MILEAGE		5,447.792 (4)

(1) The milaega in cities on Indian Reservations is includad in tha mileaga given under the heading "National Raservations". All othar city milaages ere included under the heading "Gross Mileege".

(2) Tha mileage in Neihart is given under the heeding "National Forasts".

(3) Route unsurveyed. Cer log mileage used.

(4) Aocording to Tebles I end II the total mileage of the Federel Aid Systam is 5,554.0 miles which includes the "prasant treveled wey". The designation of the several routes, many improved in pert or not at all, comprehends a shortening in distanca as e consequenca of diroct alignment, consaquantly the routa mileeges in whole show less mileaga than do the invantory tables.

Additional information respecting the location and extent of the Federal Aid System is set forth on Plate IV-A, Section 2.036.

Plate 1 depicts the growth of the designated Federal Aid or Seven Percent System in chronological order. As shown heretofore, mileages designated for inclusion on the system have fluctuated in accordance with the progressive development of the improved sections of the routings. As a route approaches completion, we have determinate data as regards its length, hence what was originally designated as a route 100 miles long may have been shortened by 5 miles as a consequence of better alignment. Since the graph reviews the growth of the system in retrospect those mileages approved as of May 16, 1938 are given for the individual years instead of those mileages given as of the date the routings were approved for inclusion in the system. Of the total mileage included in the tabulations given heretofore 129.0 miles exist as city mileage improved to standards acceptable to the Montana Highway Department and the Public Roads Administration, 106.5 miles of which were improved by these administering bodies and 22.5 miles of which exist as improvements effected by the several cities. Six miles are not improved to standard specifications but serve for the present as the traveled way. The total mileage in the cities is set tentatively at 135.0 miles and is included as a part of the data in the graph.

During the period of the designation of the system, construction activities by both State and Federal Agencies continued. Under the provisions of the Federal Highway Act of November 8, 1921 appropriations were made providing for the development of the forest highway system, coincident in part with those sections of the Seven Percent System lying within or adjacent to the national forests. Forest highway projects are supervised and controlled by the Public Roads Administration through the phases of location, design, and construction, subject, however, to concurrence by the State as regards standards and location with respect to system usage. On completion of construction and for a period of two years thereafter these projects are maintained by the Public Roads Administration. After the two year maintenance period the section is turned over to the State for maintenance, subject again, however, to state acceptance.

As of January 1, 1937 the total improved Forest Highway mileage lying on the system was 418.9 miles.

Considerable assistance was rendered the Montana Highway Department through a clause in the Federal Highway Act of November 9, 1921 providing that the Federal Government could participate up to 100% in the construction of those parts of the system lying within the National Indian Reservations. The state has administered the work subject to the inspection and concurrence of the Public Roads Administration and the U.S. Department of Interior, Office of Indian Affairs.

Rural Federal Aid construction under State Administration advanced in consonance with the amount of monies available during the period for matching with Federal funds. Funds derived from appropriating acts as follows:

1917 - License Plate law, the proceeds of which went 25% to the counties and 75% to the State Highway Funds. (1/3 of the State fund want back to the counties of origin.)

1921 - An act amending the 1917 act which gave 50% of the license plate law revenue to the counties and 50% to the highway fund.

1932 - An act that gave 100% of the license plate revenue to the counties.

Counteracting the obvious decrease in license plate revenues, gasoline tax revenues were appropriated to the department as follows:

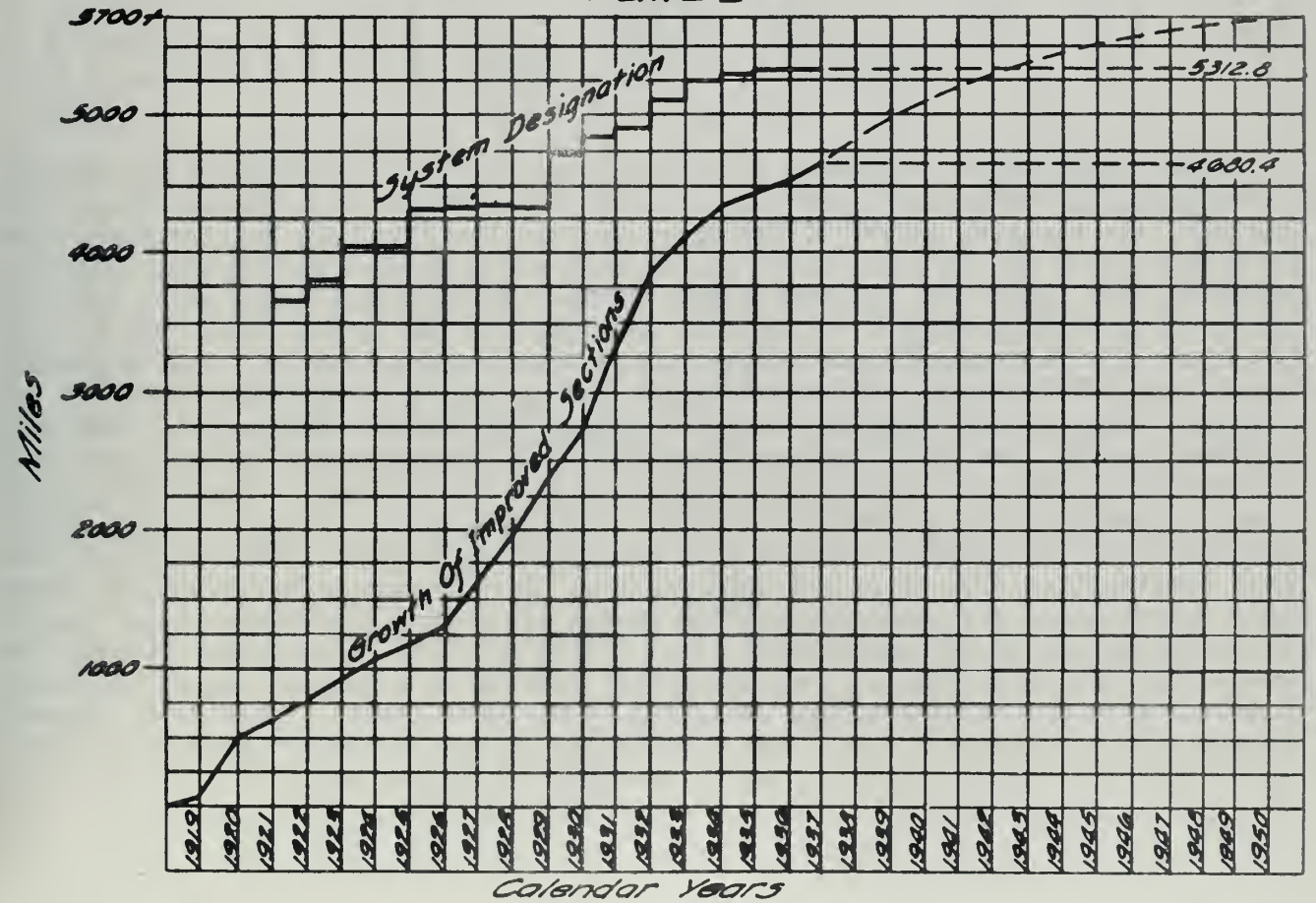
1921 - An act providing a one-cent per gallon tax - 66 2/3% of which went to the general fund of the state and 33 1/3% went to the school fund.

1923 - An act providing a two-cent per gallon tax, of which 40% was given to the state general fund; 40% to the counties for road purposes, and 20% to the state highway fund.

TABLE 4
THE RURAL FEDERAL AID HIGHWAY SYSTEM

End of Year	Showing Growth Of The Designated System, Rural & Urban and Growth Of Improved Rural Sections			
	Designated System Rural & Urban	Less City Mileage Designated As Of 1937	Rural Construction Fed. Aid Sys. All Agencies	Rural Mileage Awaiting Initial Improvement
1918	0	0	0	3665.7
1919	0	0	87.6	3598.1
1920	0	0	526.7	3137.0
1921	0	0	643.2	3022.5
1922	3803.2	3665.7	765.9	2899.8
1923	3943.1	3805.6	930.5	2875.1
1924	4172.3	4034.8	1082.5	2952.3
1925	4172.3	4034.8	1184.8	2850.0
1926	4450.0	4312.5	1339.6	2972.9
1927	4454.0	4316.5	1640.0	2676.5
1928	4402.0	4324.5	1933.4	2391.1
1929	4452.0	4314.5	2375.1	1939.4
1930	4874.4	4736.9	2700.2	2036.7
1931	4974.6	4837.1	3367.9	1469.2
1932	5023.0	4885.5	3880.1	1005.4
1933	5235.4	5097.9	4154.2	943.7
1934	5384.5	5247.0	4362.7	884.3
1935	5435.3	5297.8	4446.5	851.3
1936	5447.8	5310.3	4557.1	753.2
1937	5447.8	5312.8	4680.4	632.4

PLATE I



1925 - An act providing a two-cent per gallon tax of which 30% went to the state general fund; 55% to counties and 15% to the state highway fund.

1926 - Initiated Bill No. 31 passed by election on November 2, 1926 provided a three-cent per gallon tax all of which, other than that required for collection, went to the State Highway Fund. The 1927 Legislative assembly re-enacted the bill to provide rebates for non-highway use and to divide the state into twelve construction districts, (now existing as so-called financial districts) and allocating the expenditure of State Highway revenues in each district for each year. (See Plate II on the following page showing districts).

1929 - The Legislature increased the tax to five cents per gallon effective April 1, 1929. Refunds of five cents per gallon were provided for non-highway use.

1931-1937 - Federal emergency appropriations were provided in supplementing the routine governmental appropriations and state revenues, as a means of unemployment relief.

1931 - Gasoline tax debentures were sold in the amount of $1,500,000.00.

1932 - No gasoline tax debenture bonds were sold.

1933 - Gasoline tax debentures were sold in the amount of $1,500,000.00.

1934 - Gasoline tax debentures were sold in the amount of $1,500,000.00.

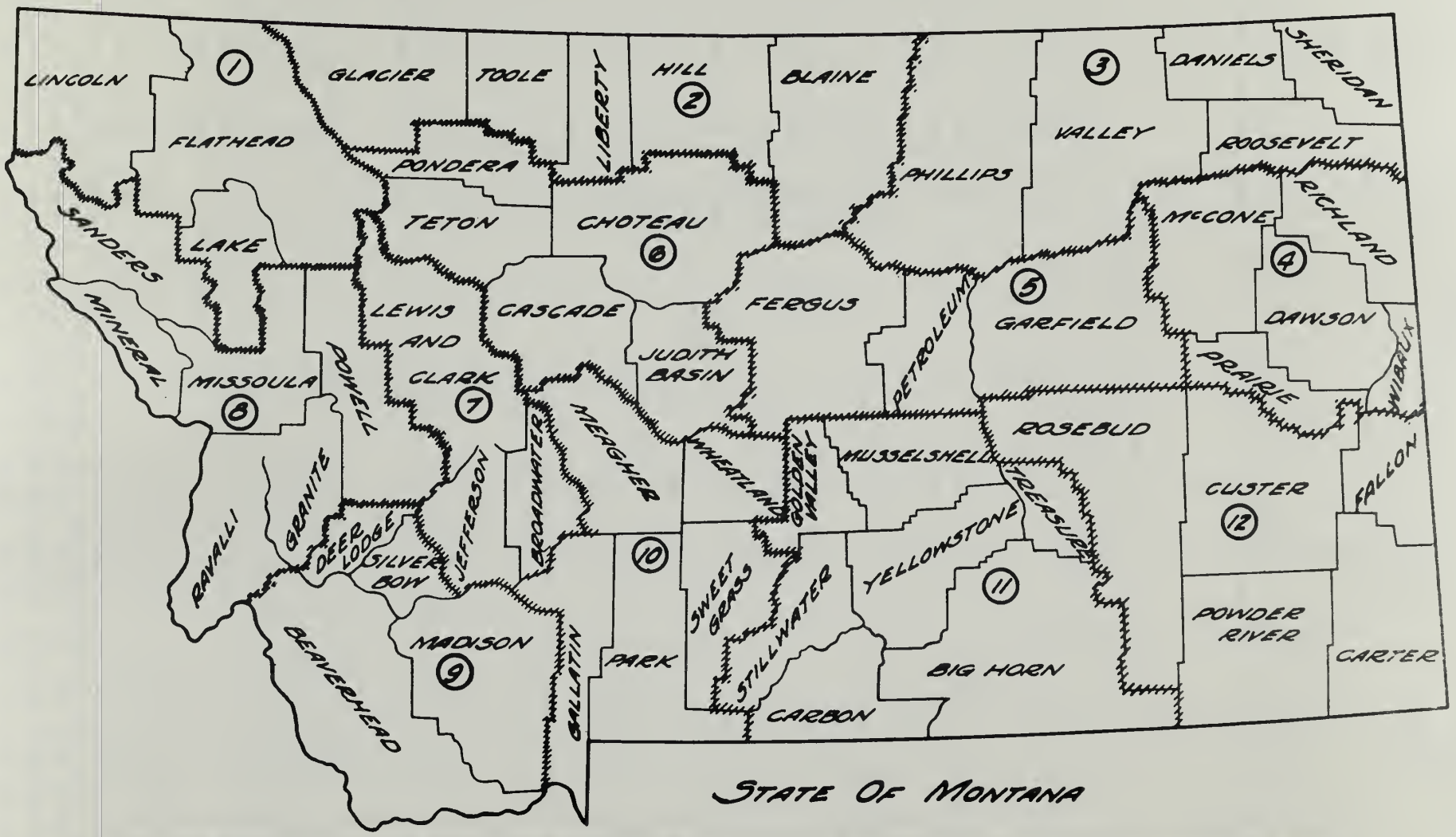
These debentures have matured or will mature as follows:

Year	Series	Date of Sale	Interest Rate	Par Value Amount Sold	Date of Maturity
1931	A	8-14-31	4 1/2%	$858,000.00	12-31-34
	B	8-14-31	4 1/2%	642,000.00	12-31-35
1933	C	8-22-33	5%	250,000.00	12-31-37
	D	12-15-33	4%	182,000.00	12-31-37
	E	12-15-33	4%	858,000.00	12-31-38
	F	12-15-33	4%	210,000.00	12-31-39
1934	G	3-30-34	4 3/4%	648,000.00	12-31-39
	H	3-30-34	4 3/4%	852,000.00	12-31-40

Table No. 4 shows the growth of the improved sections of the Federal Aid System. Here again some confusion enters as a result of the progressive designation of the system. For example, F.A.P. 9, The Virginia City-Ennis road was built in the period 1919-1921 prior to the approval of any section of the Federal Aid System. Strictly speaking then, there was no construction on the system during these years and this improved section could not be entered as a part of the system until the routing (F.A. No. 29) had been approved by the Public Roads Administration. This procedure would tend to unbalance the intent of the table, since we are interested in the growth of the improved sections in the light of its present designation. Continuing the example, NRS 281, the Vigilante Trail had been improved as a secondary road prior to the approval of the extensions of Federal Aid Route No. 29 , (March 27, 1935) from Virginia City to a junction with US #10 west of Whitehall. Again strictly speaking, there was no construction on F.A. Route No. 29, however, the table will show this construction as part of the 1934 program. By reference to the graph one finds that construction involving new mileage on the system has progressed along a curve representing any normal development i.e., slowly at first, then faster through the years 1927 and 1933, then as reconstruction sets in to a marked degree the curve levels off to approach a ceiling, delimited by the total length of the Seven Percent System when designated in full, say 4,697 miles lying outside of national reservations and 1,003 lying within, or approximately 5,700 miles in all.

PLATE II

MAP SHOWING FINANCIAL DISTRICTS



2.032 Extent of Rural Federal Aid System

We have traced the history of the designation and growth of the Rural Federal Aid System. Our interest next lies in the availability of the system, i.e., generally speaking, how is the system located with respect to certain obvious functional adjuncts of our Federal Aid Highway "plant". The factors which recommend themselves as conveniently satisfactory are land area per mile of system, registered motor vehicles per mile of system and population per mile of system. Table 5 following immediately hereafter is broken to show these relationships in each of the several financial districts, the thought being that in so doing we will be enabled to show a general low value of availability, an average value (the state at large) and a high value.

Table 5

EXTENT OF THE FEDERAL AID SYSTEM IN TERMS OF LAND AREA SERVED

MOTOR VEHICLES SERVED, AND POPULATION SERVED

County	Length						Improved			Unimproved			Total		
	Improved		Unimproved		Total		Mi. per Sq. Mi. of Land Area	Regis. Motor Veh. per Mi. 1/	Pop per Mi. 2/	Mi. per Sq. Mi. of Land Area	Regis. Motor Veh. per Mi. 1/	Pop per Mi. 2/	Mi. per Sq. Mi. of Land Area	Regis. Motor Veh. per Mi. 1/	Pop per Mi. 2/
	Miles	%	Miles	%	Miles	%									
Flathead	185.0	3.41	10.0	0.19	195.0	3.60	0.036	36	104	0.002	658	1920	0.038	34	98
Lake	85.8	1.58	1.5	0.03	87.3	1.61	0.057	30	111	0.001	172	636	0.058	30	109
Lincoln	131.4	2.43	58.7	1.08	190.1	3.51	0.036	14	54	0.016	30	112	0.052	9	37
District #1	402.2	7.42	70.2	1.30	472.4	8.72	0.039	29	89	0.007	156	510	0.046	23	76
Blaine	54.1	1.00			54.1	1.00	0.013	45	166	0.000	00	00	0.013	45	166
Glacier	152.4	2.81	14.0	0.26	166.4	3.07	0.051	16	35	0.004	173	378	0.055	15	32
Hill	80.9	1.49			80.9	1.49	0.028	47	170	0.000	000	000	0.028	47	170
Liberty	24.7	0.46			24.7	0.46	0.017	31	89	0.000	000	000	0.017	31	89
Toole	86.7	1.60			86.7	1.60	0.044	31	77	0.000	000	000	0.044	31	77
District #2	398.8	7.36	14.0	0.26	412.8	7.62	0.030	30	93	0.001	844	2642	0.031	29	90
Daniels	46.9	.88			46.9	.88	0.032	33	118	0.000	000	000	0.032	33	118
Phillips	53.5	.99	73.0	1.35	126.5	2.33	0.010	47	153	0.014	35	112	0.024	20	65
Roosevelt	145.5	2.68			145.5	2.68	0.062	21	73	0.000	000	000	0.062	21	73
Sheridan	62.5	1.15	16.3	0.30	78.8	1.46	0.037	42	160	0.010	161	613	0.047	32	125
Valley	97.7	1.80			97.7	1.80	0.019	77	114	0.000	000	000	0.019	77	114
District #3	406.1	7.50	89.3	1.65	495.4	9.14	0.026	42	112	0.006	191	509	0.032	35	92
Dawson	104.2	1.92			104.2	1.92	0.044	24	95	0.000	000	000	0.044	24	95
McCone	56.9	1.05	33.8	0.62	90.7	1.67	0.021	58	105	0.013	62	142	0.034	23	53
Prairie	28.4	0.53			28.4	0.53	0.016	33	139	0.000	000	000	0.016	33	139
Richland	55.7	1.03	33.9	0.63	89.6	1.66	0.026	56	83	0.000	92	264	0.026	35	108
Wibaux	13.2	0.24	2.6	0.05	15.8	0.29	0.015	61	210	0.003	309	1064	0.018	51	175
District #4	258.4	4.77	70.3	1.30	328.7	6.07	0.027	37	102	0.007	135	374	0.034	29	80
Fergus	115.0	2.12	68.9	1.27	183.9	3.39	0.027	42	144	0.016	70	240	0.043	26	90
Garfield	135.5	2.50	57.2	1.06	192.7	3.56	0.028	7	31	0.012	17	74	0.040	5	22
Petroleum	40.1	.74			40.1	.74	0.024	13	51	0.000	000	000	0.024	13	51
District #5	290.6	5.36	126.1	2.33	416.7	7.69	0.027	8	79	0.012	19	181	0.039	6	55
Cascade	191.5	3.53			191.5	3.53	0.071	63	215	0.000	000	000	0.071	63	215
Choteau	71.3	1.32			71.3	1.32	0.018	41	121	0.000	000	000	0.018	41	121
Judith Basin	57.4	1.06			57.4	1.06	0.031	25	92	0.000	000	000	0.031	25	92
Pondera	52.2	0.96			52.2	0.96	0.031	48	133	0.000	000	000	0.031	48	133
Teton	91.5	1.69			91.5	1.69	0.040	28	66	0.000	000	000	0.040	28	66
District #6	463.9	8.56			463.9	8.56	0.037	47	147	0.000	000	000	0.037	47	147
Broadwater	80.0	1.48			80.0	1.48	0.066	11	34	0.000	000	000	0.066	11	34
Jefferson	105.6	1.95			105.6	1.95	0.065	12	39	0.000	000	000	0.065	12	39
Lewis & Clark	134.6	2.48	56.6	1.04	191.2	3.52	0.039	44	135	0.017	125	322	0.056	37	95
District #7	320.2	5.91	56.6	1.04	376.8	6.95	0.051	29	78	0.009	181	461	0.060	25	67

Table 5 (Continued)

County	Length						Improved			Unimproved			Total		
	Improved		Unimproved		Total		Mi. per Sq. Mi. of Land Area	Regis Motor Veh. per Mi. 1/	Pop per Mi. 2/	Mi. per Sq. Mi. of Land Area	Regis Motor Veh. per Mi. 1/	Pop per Mi. 2/	Mi. per Sq. Mi. of Land Area	Regis Motor Veh. per Mi. 1/	Pop per Mi. 2/
	Miles	%	Miles	%	Miles	%									
Granite	82.6	1.52	7.8	0.14	90.4	1.66	0.048	13	36	0.005	14	39	0.053	12	33
Mineral	79.1	1.46			79.1	1.46	0.064	8	21	0.000	000	000	0.064	8	21
Missoula	98.6	1.82	29.2	0.54	127.8	2.36	0.038	82	221	0.012	276	746	0.050	63	170
Powell	61.9	1.14	37.7	0.70	99.6	1.84	0.027	34	100	0.016	55	165	0.043	21	62
Ravalli	91.2	1.68	11.0	0.20	102.2	1.88	0.038	40	113	0.005	334	938	0.043	36	101
Sanders	121.1	2.24	44.2	0.82	165.3	3.06	0.042	13	47	0.016	36	129	0.058	10	34
District #8	534.5	9.86	129.9	2.40	664.4	12.26	0.041	32	91	0.010	132	374	0.051	26	73
Beaverhead	85.9	1.59			85.9	1.59	0.015	28	77	0.000	000	000	0.015	28	77
Deer Lodge	42.4	0.78	2.0	0.04	44.4	0.82	0.058	81	384	0.003	1725	8146	0.061	78	367
Madison	119.4	2.20	22.8	0.42	142.2	2.62	0.033	17	53	0.006	87	277	0.039	14	44
Silver Bow	59.6	1.10			59.6	1.10	0.082	205	956	0.000	000	000	0.082	205	956
District #9	307.3	5.67	24.8	0.46	332.1	6.13	0.029	165	381	0.002	809	3477	0.031	60	260
Gallatin	79.0	1.46			79.0	1.46	0.032	76	204	0.000	000	000	0.032	76	204
Meagher	95.0	1.75	7.1	0.13	102.1	1.88	0.040	8	24	0.003	103	320	0.043	7	22
Park	126.7	2.34	0.3	0.01	127.0	2.35	0.048	30	86	0.000	12503	36407	0.048	30	86
Sweetgrass	36.4	0.67			36.4	0.67	0.029	34	108	0.000	000	000	0.029	34	108
Wheatland	44.4	0.82			44.4	0.82	0.031	22	84	0.000	000	000	0.031	22	84
District #10	381.5	7.04	7.4	0.14	388.9	7.18	0.035	33	97	0.001	1719	5002	0.036	33	95
Big Horn	86.6	1.60	39.3	0.73	125.9	2.33	0.017	28	99	0.008	62	217	0.025	19	68
Carbon	89.0	1.64			89.0	1.64	0.043	37	141	0.000	000	000	0.043	37	141
Golden Valley	28.1	0.52			28.1	0.52	0.023	12	54	0.000	000	000	0.023	12	54
Musselshell	96.7	1.78	2.1	0.04	98.8	1.82	0.053	18	75	0.001	848	3429	0.054	18	73
Stillwater	38.1	0.70			38.1	0.70	0.021	47	164	0.000	000	000	0.021	47	164
Treasure	28.7	0.53			28.7	0.53	0.030	16	58	0.000	000	000	0.030	16	58
Yellowstone	128.7	2.38			128.7	2.38	0.049	90	239	0.000	000	000	0.049	90	239
District #11	495.9	9.15	41.4	0.76	537.3	9.91	0.032	44	140	0.003	526	1671	0.035	41	129
Carter	50.0	0.92	1.4	0.02	51.4	0.94	0.033	21	83	0.000	654	2854	0.033	21	80
Custer	160.5	2.96			160.5	2.96	0.043	20	70	0.000	000	000	0.043	20	70
Fallon	67.3	1.24			67.3	1.24	0.042	17	68	0.000	000	000	0.042	17	68
Powder River	71.5	1.32	18.7	0.35	90.2	1.67	0.021	12	55	0.006	45	209	0.027	9	43
Rosebud	71.7	1.33	88.5	1.63	160.2	2.96	0.014	25	102	0.018	20	83	0.032	11	46
District #12	421.0	7.77	108.6	2.00	529.6	9.77	0.025	19	122	0.006	74	287	0.031	15	59
Statewide	4680.4	86.37	738.6	13.63	5419.0	100.00	0.032	36	115	0.005	227	728	0.037	31	99

1/ Total registration, rural & urban.

2/ Total population, rural & urban.

In presenting these comparisons with respect to the extent of the system, we have introduced four of several functional bases in Highway Administration. No attempt is here being made to suggest these bases as criteria in the distribution and allocation of funds in construction of the Federal Aid System in our State. The data however, are at hand and invite research in matter pertaining to the relative need or sufficiency of the several financial districts.

2.033 Inventory of The Rural Federal Aid System

Next of interest now that the system is evaluated with respect to its availability, is its extent in terms of condition. In other words we have set forth the history of the plant and its availability, now what does the system offer as its part in the business of highway transportation. Tables 6A, 6B, and 6C as follows set forth the inventory of the rural Federal Aid System and average traffic volume therefor.

Table 6A

SHOWING MILEAGE OF FEDERAL AID SYSTEM CLASSIFIED BY

COMPONENT ROAD SYSTEMS.

County	Improved Roads				Unimproved (Present Travelled Way)				Total All Roads on Federal Aid System
	Federal Aid & Federal Lands Pro.	National Forest Highway Projects	National Parks Highways Projects	Sub Total Improved	County Roads	National Forest Development Roads	National Indian Reservation Roads	Sub Total Unimproved	
Flathead	129.8	55.2		185.0	10.0			10.0	195.0
Lake	85.8			85.8	1.5			1.5	87.3
Lincoln	81.9	49.5		131.4	46.8	11.9		58.7	190.1
District #1	297.5	104.7		402.2	58.3	11.9		70.2	472.4
Blaine	54.1			54.1					54.1
Glacier	143.5	5.4	3.5	152.4	14.0			14.0	166.4
Hill	80.9			80.9					80.9
Liberty	24.7			24.7					24.7
Toole	86.7			86.7					86.7
District #2	389.9	5.4	3.5	398.8	14.0			14.0	412.8
Daniels	46.9			46.9					46.9
Phillips	53.5			53.5	73.0			73.0	126.5
Roosevelt	145.5			145.5					145.5
Sheridan	62.5			62.5	16.3			16.3	78.8
Valley	97.7			97.7					97.7
District #3	406.1			406.1	89.3			89.3	495.4
Daweon	104.2			104.2					104.2
McCone	56.9			56.9	33.8			33.8	90.7
Prairie	28.4			28.4					28.4
Richland	55.7			55.7	33.9			33.9	89.6
Wibaux	13.2			13.2	2.6			2.6	15.8
District #4	258.4			258.4	70.3			70.3	328.7
Fergue	115.0			115.0	68.9			68.9	183.9
Garfield	135.5			135.5	57.2			57.2	192.7
Petroleum	40.1			40.1					40.1
District #5	290.6			290.6	126.1			126.1	416.7
Cascade	160.8	30.7		191.5					191.5
Chouteau	71.3			71.3					71.3
Judith Basin	57.4			57.4					57.4
Pondera	52.2			52.2					52.2
Teton	91.5			91.5					91.5
District #6	433.2	30.7		463.9					463.9
Broadwater	70.6	9.4		80.0					80.0
Jefferson	100.0	5.6		105.6					105.6
Lewis & Clark	128.0	6.6		134.6	48.6	8.0		56.6	191.2
District #7	298.6	21.6		320.2	48.6	8.0		56.6	376.8
Granite	65.9	16.7		82.6	7.8			7.8	90.4
Mineral	23.0	56.1		79.1					79.1
Missoula	92.1	6.5		98.6	29.2			29.2	127.8
Powell	57.7	4.2		61.9	37.7			37.7	99.6
Ravalli	67.6	23.6		91.2	11.0			11.0	102.2
Sanders	52.5	68.6		121.1	33.6	10.6		44.2	165.3
District #8	358.8	175.7		534.5	119.3	10.6		129.9	664.4
Beaverhead	85.9			85.9					85.9
Deer Lodge	38.9	3.5		42.4	2.0			2.0	44.4
Madison	114.5	4.9		119.4	22.8			22.8	142.2
Silver Bow	58.6	1.0		59.6					59.6
District #9	297.9	9.4		307.3	24.8			24.8	332.1
Gallatin	45.0	34.0		79.0					79.0
Meagher	74.7	20.3		95.0	7.1			7.1	102.1
Park	119.0	7.7		126.7	0.3			0.3	127.0
Sweetgrass	36.4			36.4					36.4
Wheatland	44.4			44.4					44.4
District #10	319.5	62.0		381.5	7.4			7.4	388.9

Table 6A (Continued)

County	Improved Roads				Unimproved (Present Travelled Way)				Total All Roads on Federal Aid System
	Federal Aid & Federal Lands Pro.	National Forest Highway Projects	National Parks Highway Projects	Sub Total Improved	County Roads	National Forest Development Roads	National Indian Reservation Roads	Sub Total Unimproved	
Big Horn	86.6			86.6	39.3			39.3	125.9
Carbon	84.8	4.2		89.0					89.0
Golden Valley	28.1			28.1					28.1
Musselshell	96.7			96.7	2.1			2.1	98.8
Stillwater	38.1			38.1					38.1
Treasure	28.7			28.7					28.7
Yellowstone	128.7			128.7					128.7
District #11	491.7	4.2		495.9	41.4			41.4	537.3
Carter	50.0			50.0	1.4			1.4	51.4
Custer	160.5			160.5					160.5
Fallon	67.3			67.3					67.3
Powder River	66.3	5.2		71.5	18.7			18.7	90.2
Rosebud	71.7			71.7	85.3		3.2	88.5	160.2
District #12	415.8	5.2		421.0	105.4		3.2	108.6	529.6
Statewide	4258.0	418.9	3.5	4680.4	704.9	30.5	3.2	738.6	5419.0

Table 6B

INVENTORY OF THE FEDERAL AID SYSTEM AND AVERAGE TRAFFIC VOLUME

County	Surface Type																		Total All Roads	
	Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Sub-Total Improved		Unimproved			
	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.
Flathead					68.6	384	87.3	284	21.8	106	3.2	218	4.1	45	185.0	292	10.0	138	195.0	284
Lake			0.5	724	54.6	566	24.1	593					6.6	45	85.8	534	1.5	35	87.3	531
Lincoln					2.7	240	30.2	105	38.8	94	28.0	82	31.7	65	131.4	90	58.7	57	190.1	79
District #1			0.5	724	125.9	457	141.6	291	60.6	98	31.2	96	42.4	60	402.2	278	70.2	68	472.4	247
Blaine					18.6	464	32.1	539			3.4	738			54.1	526			54.1	526
Glacier					26.7	240	111.4	213	14.3	75					152.4	205	14.0	66	166.4	194
Hill					22.4	461	58.5	355							80.9	384			80.9	384
Liberty					11.0	188	13.7	176							24.7	181			24.7	181
Toole					15.6	195	71.1	335							86.7	310			86.7	310
District #2					94.3	323	286.8	307	14.3	75	3.4	738			398.8	306	14.0	86	412.8	299
Daniels							46.9	158							46.9	158			46.9	158
Phillips					24.7	400	28.8	335							53.5	365	73.0	29	126.5	171
Roosevelt					0.7	260	144.8	264							145.5	264			145.5	264
Sheridan					12.0	147	40.4	183	10.1	96					62.5	162	16.3	74	78.8	144
Valley					20.4	1651	77.3	553							97.7	782			97.7	782
District #3					57.8	787	338.2	312	10.1	96					406.1	374	89.3	37	495.4	313
Dawson			0.3	983	20.4	279	83.5	201							104.2	218			104.2	218
McCone							41.9	111	15.0	34					56.9	91	33.8	49	90.7	75
Prairie							28.4	354							28.4	354			28.4	354
Richland					13.8	684	34.0	254	7.9	95					55.7	338	33.9	18	89.6	217
Wibaux					10.9	277	2.3	214							13.2	266	2.6	40	15.8	228
District #4			0.3	983	45.1	402	190.1	214	22.9	55					258.4	233	70.3	34	328.7	190
Fergus			1.2	822	33.0	379	46.4	214	34.4	149					115.0	248	68.9	23	183.9	164
Garfield							60.4	108	53.2	78			21.9	13	135.5	80	57.2	49	192.7	70
Petroleum							40.1	107							40.1	107			40.1	107
District #5			1.2	822	33.0	379	146.9	141	87.6	106			21.9	13	290.6	151	126.1	35	416.7	116

Table 6B (Continued)

County	Surface Type																Total All Roads	
	Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Gradad & Drained		Sub-Total Improved		Unimproved			
	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.
Cascade	2.9	614	0.1	290	45.0	525	120.0	426	20.6	103	2.9	126			191.5	413			191.5	413
Choteau							71.3	419							71.3	419			71.3	419
Judith Basin					18.7	280	38.7	238							57.4	251			57.4	251
Pondera							52.2	261							52.2	261			52.2	261
Teton					0.6	83	90.9	236							91.5	235			91.5	235
District #6	2.9	614	0.1	290	64.3	450	373.1	336	20.6	103	2.9	126			463.9	342			463.9	342
Broadwater					15.5	441	64.5	243							80.0	281			80.0	281
Jefferson					100.1	563	5.5	692							105.6	570			105.6	570
Lewis & Clark					47.9	579	86.7	238							134.6	361	56.6	11	191.2	267
District #7					163.5	556	156.7	256							320.2	409	56.6	11	376.8	349
Granite					45.0	437	17.7	489	6.3	49			13.6	29	82.6	351	7.8	13	90.4	322
Mineral			0.1	490	29.2	517	49.8	559							79.1	543			79.1	543
Missoula			0.1	1630	75.8	817	17.8	540	3.2	100			1.7	100	98.6	730	29.2	73	127.8	379
Powell					61.9	555									61.9	555	37.7	17	99.6	351
Ravalli					44.2	487	6.9	156					40.1	59	91.2	274	11.0	31	102.2	253
Sanders					28.9	302	85.8	205	6.4	90					121.1	222	44.2	62	165.3	180
District #8			0.2	1060	285.0	563	178.0	364	15.9	76			55.4	53	534.5	430	129.9	50	664.4	396
Beaverhead					85.9	307									85.9	307			85.9	307
DeerLodge			8.0	1246	30.9	650	3.5	299							42.4	733	2.0	41	44.4	702
Madison			0.1	160	22.7	251	71.8	164	15.9	131	8.9	106			119.4	172	22.8	134	142.2	165
Silver Bow			14.4	1756	41.3	548	3.9	1674							59.6	914			59.6	914
District #9			22.5	1567	180.8	414	79.2	245	15.9	131	8.9	106			307.3	431	24.8	127	332.1	407
Gallatin					49.5	798	29.5	213							79.0	579			79.0	579
Meagher							63.5	93	4.6	93	19.9	87	7.0	106	95.0	92	7.1	103	102.1	93
Park			0.1	380	73.7	594	33.8	261	19.1	98					126.7	430	0.3	277	127.0	429
Sweet Grass					36.4	557									36.4	557			36.4	557
Wheatland							44.4	191							44.4	191			44.4	191
District #10			0.1	380	159.6	649	141.2	172	23.7	97	19.9	87	7.0	106	301.5	303	7.4	110	308.9	390
Big Horn							78.5	416					8.1	47	86.6	381	39.3	41	125.9	275
Carbon					4.2	262	84.8	521							89.0	510			89.0	510
Golden Valley					16.1	124	12.0	150							28.1	135			28.1	135
Musselshell							63.1	320					33.6	75	96.7	235	2.1	1	98.8	232
Stillwater					38.1	616									38.1	616			38.1	616
Treasure					28.7	357									28.7	357			28.7	357
Yellowstone			0.2	880	10.3	697	118.2	740							128.7	737			128.7	737
District #11			0.2	880	97.4	452	356.6	523					41.7	69	495.9	471	41.4	39	537.3	438
Carter							38.4	63	11.6	104					50.0	73	1.4	58	51.4	72
Custer					27.4	493	133.1	170							160.5	225			160.5	225
Fallon					3.4	181	26.9	129	37.0	141					67.3	138			67.3	138
Powder River							47.3	87					24.2	22	71.5	65	18.7	66	90.2	65
Rosebud					25.5	454	33.5	257	12.7	25					71.7	286	88.5	23	160.2	140
District #12					56.3	456	279.2	147	61.3	110			24.2	22	421.0	176	108.6	31	529.6	146
Statewide	2.9	614	25.1	1489	1363.0	500	2697.6	298	332.9	99	66.3	129	192.6	52	4680.4	338	738.6	43	5419.0	298

TABLE 6C
TRAFFIC DENSITY CLASSIFICATION OF THE FEDERAL AID SYSTEM BY SURFACE TYPES IN MONTANA

Surface Types	Traffic Volume Groups																	Total Mileage	Average Traffic
	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 - 2999		
	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Units
Bituminous Macadam										2.9								2.9	614
Concrete Paving					0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.4	0.4	4.5	6.0	11.8	0.6	25.1	1489
High Type Bituminous Paving			0.1	0.3	55.5	90.1	261.7	316.4	334.0	153.7	62.9	60.5	8.5	3.5	3.5	6.9	5.4	1363.0	500
Low Type Bituminous Paving				131.1	720.4	835.2	391.4	225.0	243.6	67.1	48.9	31.1	1.2	0.6	0.6	1.2	0.2	2697.6	298
Plain Macadam	0.6	10.5	16.4	123.0	182.4													332.9	99
Plain Gravel				52.8	8.2	1.5	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4				66.3	129
Graded & Drained	4.6	34.6	42.6	104.7	6.1													192.6	52
All Improved Types	5.2	45.1	59.1	411.9	972.7	926.9	653.9	542.1	578.3	224.5	112.6	92.4	10.5	9.0	10.1	19.9	6.2	4680.4	338
Unimproved Types	27.6	191.5	285.8	202.5	30.9	0.2	0:1											738.6	43
All Types	32.8	236.6	344.9	614.4	1003.6	927.1	654.0	542.1	578.3	224.5	112.6	92.4	10.5	9.0	10.1	19.9	6.2	5419.0	298

PLATE III-B

Usage Of The Federal Aid System By Surface Types In Montana

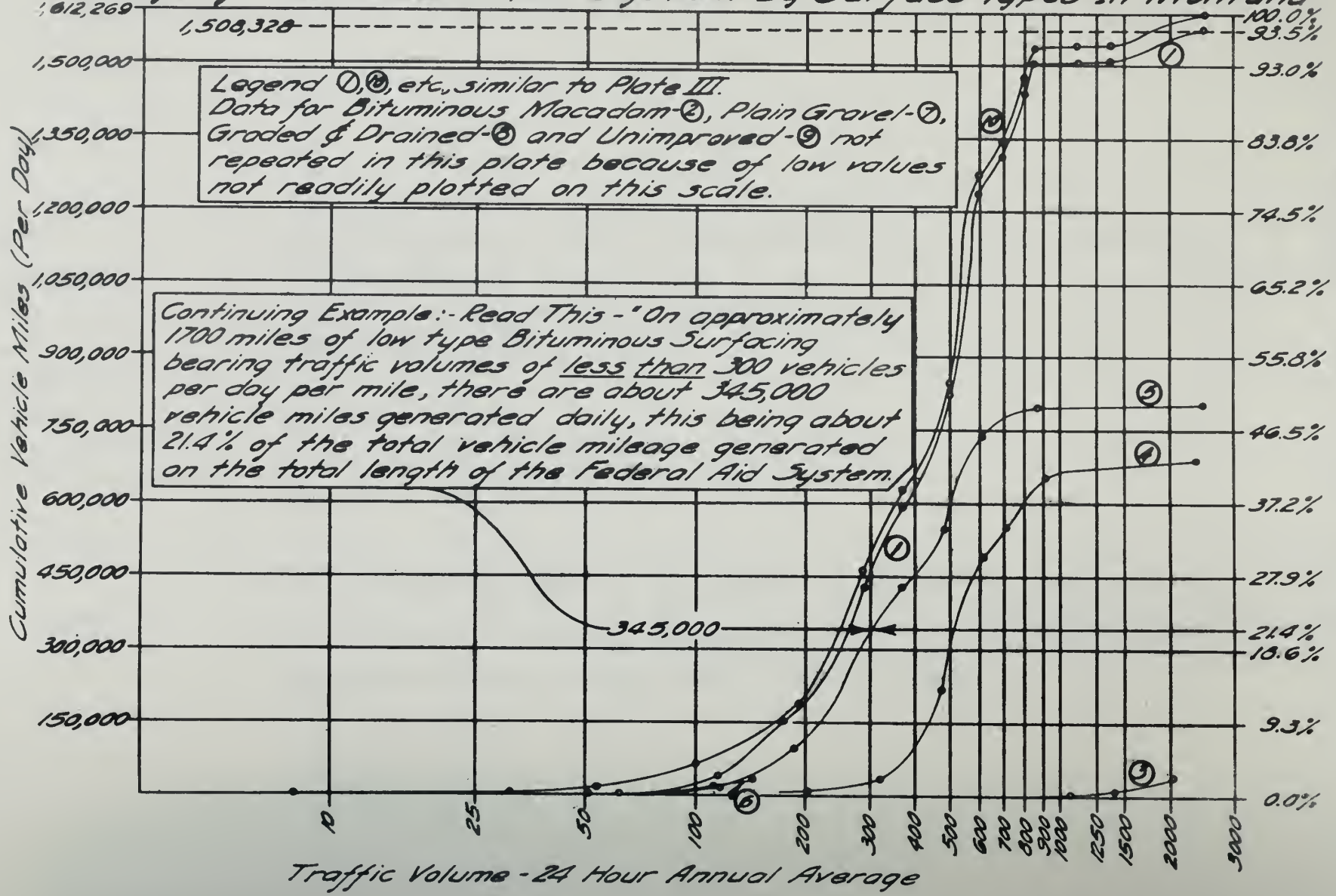
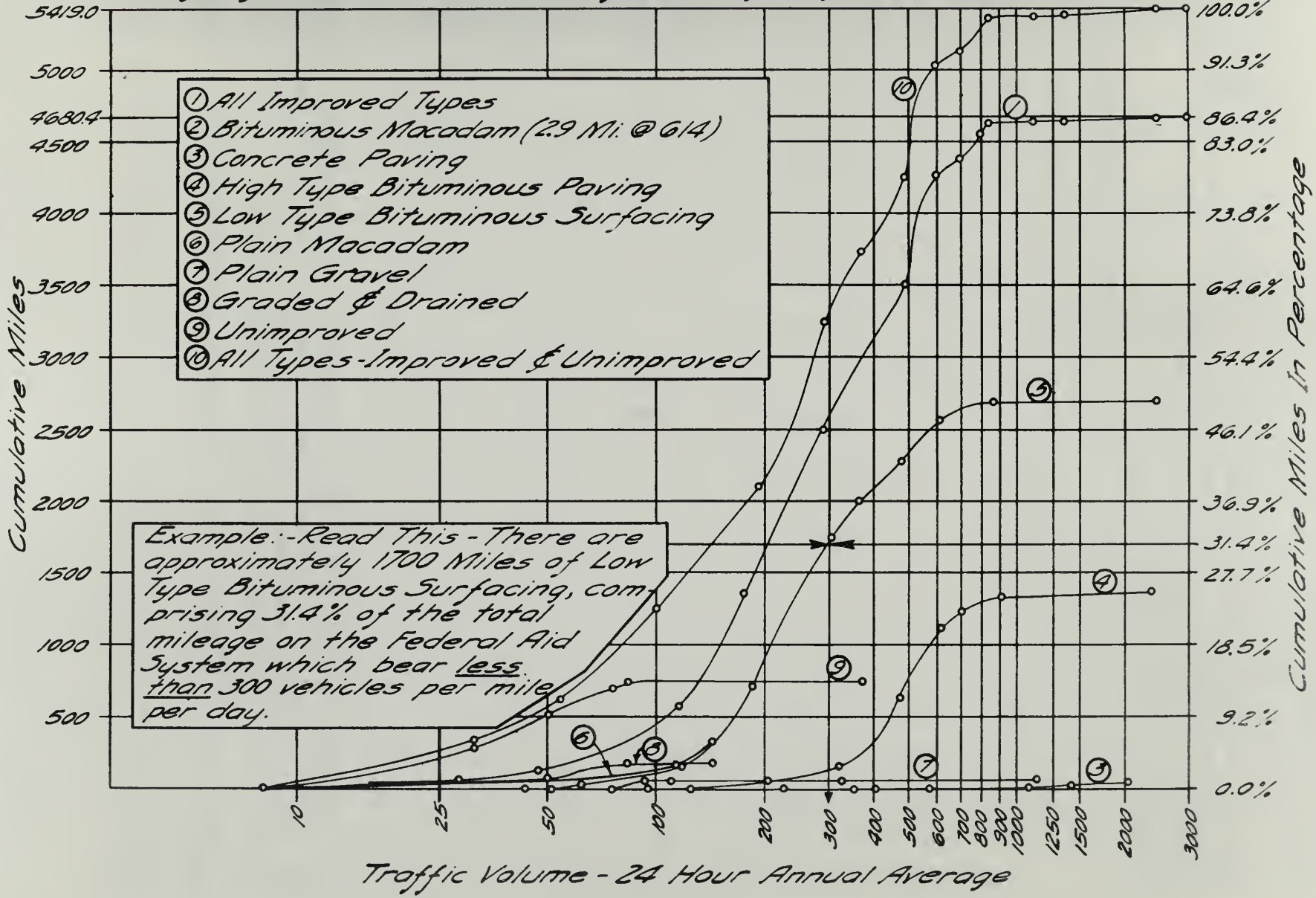


PLATE III-A

Usage Of The Federal Aid System By Surface Types In Montana



By reference to Tables 6B and 6C and Plates III A and III B, we find several significant features with respect to tendencies in the use of the several surface types comprising the Federal Aid System which are tabulated below.

N.B: Plates III A and III B are set forth on semi-logarithmic scales to "open up" the values in the lower traffic volume groups. For example, if we were to plot the traffic volume groups on a straight arithmetical scale, the mileage bearing less than 100 vehicles per day would be restricted on the plate to a horizontal distance of approximately one-quarter of an inch.

Types	Percent of Total Length	Traffic Data					Counties wherein surface type bears more than average traffic volume given for each surface type.
		Average	Rating 1/	Range	Modal Class 2/	Median 3/	
Bit. Mac.	0.1	614	2.6	600-699	600-699	650	One occurrence only in Cascade County.
Concrete Paving	0.8	1489	5.0	95-2039	1500-1999	1483	Missoula Silver Bow
High Type Bituminous Paving	25.1	500	1.7	43-2390	500-599	486	Lake, Valley Richland, Cascade, Jefferson Lewis & Clark, Mineral, Missoula, Powell, DeerLodge, Silver Bow, Gelletin, Park, Sweet Grass, Stillwater, Yellowstone
Low Type Bituminous Paving	49.8	298	1.0	50-2481	200-299	259	Lake, Blaine, Rill, Toole, Phillips, Valley, Prairie, Cascade, Chouteau, Jefferson Granite, Mineral, Missoula, Deerlodge, Silver Bow, Big Horn, Carbon, Musselshell, Yellowstone.
Plain Macadam	6.1	99	0.33	7-143	100-199	117	Flathead, Fergus, Cascade, Missoula, Madison, Carter, Fallon.
Plain Gravel	1.2	129	0.43	75-1151	50-99	81	Flathead, Cascade.
Graded & Drained	3.5	52	0.17	7-144	50-99	54	Lincoln, Missoula, Revelli, Meagher, Musselshell.
Improved Types	86.4	338	1.1	8-2481	100-199	290	Lake, Blaine, Hill, Phillips, Valley, Prairie, Cascade, Chouteau, Jefferson. Lewis & Clark, Granite, Mineral, Missoula, Powell, DeerLodge, Silver Bow, Gelletin, Park, Sweet Grass, BigHorn, Carbon, Stillwater, Treasure, Yellowstone.
Unimproved Types	13.6	43	0.14	0-371	25-49	38	Flathead, Lincoln, Glacier, Sheridan, McCone, Garfield, Missoula, Ravalli, Sanders, Madison, Meagher, Park, Carter, Powder River.
All Types	100.0	298	1.0	0-2481	100-199	251	Lake, Blaine, Hill, Toole, Valley, Prairie, Cascade, Chouteau, Jefferson, Granite, Mineral, Missoula, Powell, Beaverhead, DeerLodge, Silver Bow, Gallatin, Park, Sweet Grass, Carbon, Stillwater, Treasure, Yellowstone.

1/ "assigning the value 1.0 to the average traffic for the Federal Aid System (298) the surface types are rated in accordance therewith, hence we find that concrete paving carries traffic 5 times that carried by low type bituminous surfacing and approximately 3 times that carried by high type bituminous paving."

2/ The value on the scale of traffic densities corresponding to the largest single mileage.

3/ The value on the scale of traffic densities which divides the mileage into two equal parts.

Referring once again to Table 6C we find that the greatest mileage in any one group interval falls in that from 100-199, hence it is reasonable to say that a typical low range of traffic for the system would terminate at 150. In discussion hereafter, we will refer to traffic volumes ranging from 0 to 150 on the Federal Aid System as being of low value, however, the range in turn is typical of high traffic values on the State Secondary System.

2.034--Classification of the Federal Aid System in Width Groups

A prime consideration in the analysis of the adequacy of any system is that relating to its convenience as a medium of highway transport in terms of capacity and safety. If the wearing course is narrow, speed is inhibited, hence the capacity is restricted. Some few intervals along the system now are posted with definite speed limits imposed as a consequence of deficient width. To alleviate the condition would necessitate partial reconstruction. Table No.7A presents data as regards existing surface widths and discussion following immediately thereafter on the basis of safe practical widths shows the designed and constructed widths to be satisfactory in the main.

Table 7A

SURFACED TYPES GROUPED ACCORDING TO SURFACED WIDTH AND GRADED AND DRAINED. UNIMPROVED AND PRIMITIVE TYPES CLASSIFIED ACCORDING TO WIDTH OF TRAVELED WAY.

County	Paved Surface Types													
	Bituminous Macadam					Concrete Paving					High Type Bituminous			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Flathead												68.4	0.2	
Lake							0.5					54.6		
Lincoln												2.7		
District #1							0.5					125.7	0.2	
Blaine												18.6		
Glacier												26.7		
Hill												22.4		
Liberty												11.0		
Toole												15.6		
District #2												94.3		
Daniels														
Phillips												24.7		
Roosevelt												0.7		
Sheridan												12.0		
Valley												20.4		
District #3												57.8		
Dawson							0.3					20.4		
McCone														
Prairie														
Richland												13.8		
Wibaux												10.9		
District #4							0.3					45.1		
Fergus							1.2					33.0		
Garfield														
Petroleum														
District #5							1.2					33.0		
Cascade		2.9					0.1					45.0		
Chouteau														
Judith Basin												18.7		
Pondera														
Teton												0.6		
District #6		2.9					0.1					64.3		
Broadwater												15.5		
Jefferson												100.1		
Lewis & Clark												47.9		
District #7												163.5		
Granite												44.0		0.2
Mineral							0.1					29.2		
Missoula							0.1					75.8		
Powell												61.9		
Ravalli												44.2		
Sanders												28.9		
District #8							0.2					284.8		0.2

Table 7a

WIDTH CLASSIFICATION OF THE FEDERAL AID SYSTEM

County	Paved Surface Types													
	Bituminous Macadam					Concrete Paving					High Type Bituminous			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Beaverhead												85.9		
Deerlodge							8.0					30.9		
Madison							0.1					22.7		
Silver Bow							14.4					41.3		
District #9							22.5					180.8		
Gallatin												49.5		
Park							0.1					73.7		
Sweet Grass												36.4		
Meagher														
Wheatland														
District #10							0.1					159.6		
Big Horn														
Carbon												4.2		
Golden Valley												16.1		
Musselshell														
Stillwater												38.1		
Treasure												28.7		
Yellowstone							0.2					10.3		
District #11							0.2					97.4		
Carter														
Custer												27.4		
Fallon												3.4		
Powder River														
Rosebud												25.5		
District #12												56.3		
Statewide		2.9					25.1					1362.6	0.2	0.2

Table 7a (Continued)

County	Lesser Surfaced Types													
	Low Type Bituminous					Plain Macadam					Plain Gravel			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Flathead	11.3	76.0				13.0	8.8				3.2			
Lake		24.1												
Lincoln	2.3	27.9				25.7	13.1				21.2	6.8		
District #1	13.6	128.0				38.7	21.9				24.4	6.8		
Blaine		32.1										3.4		
Glacier		111.4					14.3							
Hill		58.5												
Liberty		13.7												
Toole		71.1												
District #2		286.8					14.3					3.4		
Daniels		46.9												
Phillips		28.8												
Roosevelt	18.3	126.5												
Sheridan		40.4					10.1							
Valley		77.3												
District #3	18.3	319.9					10.1							
Dawson		83.5												
McCone	1.8	40.1					15.0							
Prairie		28.4												
Richland		34.0					7.9							
Wibaux		2.3												
District #4	1.8	188.3					22.9							
Fergus	9.1	37.3					34.4							
Garfield		59.8			0.6		53.2							
Petroleum		40.1												
District #5	9.1	137.2			0.6		87.6							
Cascade		120.0				15.6	5.0					2.9		
Chouteau		71.3												
Judith Basin		38.7												
Pondera		52.2												
Teton		90.9												
District #6		373.1				15.6	5.0					2.9		
Broadwater	7.6	56.9												
Jefferson		5.5												
Lewis & Clark	6.9	79.8												
District #7	14.5	142.2												
Granite		17.7					6.3							
Mineral		49.8												
Missoula		17.8					3.2							
Powell														
Ravalli		6.9												
Sanders	21.9	63.9					6.4							
District #8	21.9	156.1					15.9							
Beaverhead														
Deer Lodge		3.5												
Madison		71.8				6.3	9.6				8.9			
Silver Bow		3.9												
District #9		79.2				6.3	9.6				8.9			
Gallatin		29.1			0.4									
Meagher	10.6	52.9					4.6					19.9		
Park	13.1	20.7					19.1							
Sweet Grass														
Wheatland		44.4												
District #10	23.7	147.1			0.4		23.7					19.9		

Table 7A (Continued)

County	Lesser Surfaced Types													
	Low Type Bituminous					Plain Macadam					Plain Gravel			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Big Horn		78.5												
Carbon	4.5	80.3												
Golden Valley		12.0												
Musselshell		63.1												
Stillwater														
Treasure														
Yellowstone		117.0	1.2											
District #11	4.5	350.9	1.2											
Carter		38.4					11.6							
Custer		133.1												
Fallon		26.9				37.0								
Powder River	14.8	32.5												
Rosebud		33.5					12.7							
District #12	14.8	264.4				37.0	24.3							
Statewide	122.2	2573.2	1.2		1.0	97.6	235.3				33.3	33.0		

Table 7A (Continued)

County	Unsurfaced Types													
	Graded & Drained					Unimproved					Primitive			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Flathead			4.1			4.6	5.4							
Lake			6.6			15.3	13.8							
Lincoln		23.2	8.5			29.6	1.5							
District #1		23.2	19.2			49.5	20.7							
Blaine														
Glacier							14.0							
Hill														
Liberty														
Toole														
District #2							14.0							
Daniels														
Phillips						3.7	50.3				19.0			
Roosevelt														
Sheridan							16.3							
Valley														
District #3						3.7	66.6				19.0			
Dawson														
McCone							31.5				2.3			
Prairie														
Richland							33.9							
Wibaux							2.6							
District #4							68.0				2.3			
Fergus						18.7	44.2			0.2	5.8			
Garfield		12.6	9.3				57.2							
Petroleum														
District #5		12.6	9.3			18.7	101.4			0.2	5.8			
Cascade														
Chouteau														
Judith Basin														
Pondera														
Teton														
District #6														
Broadwater														
Jefferson														
Lewis & Clark						14.5	26.8				15.3			
District #7						14.5	26.8				15.3			
Granite	13.6					2.6					5.2			
Mineral														
Missoula		1.7				29.2								
Powell							31.1				6.6			
Ravalli	7.9	32.2					11.0							
Sanders						39.2	5.0							
District #8	21.5	33.9				71.0	47.1				11.8			
Beaverhead														
Deer Lodge						2.0								
Madison							22.8							
Silver Bow														
District #9						2.0	22.8							
Gallatin														
Meagher		7.0					7.1							
Park							0.3							
Sweet Grass														
Wheatland														
District #10		7.0					7.4							

Table 7A (Continued)

County	Unsurfaced Types												
	Graded & Dreined					Unimproved				Primitive			
	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44	45 & Over	Under 16	16-26	27-35	36-44
Big Horn		8.1					39.3							
Carbon														
Golden Valley														
Musselshell			33.6				2.1							
Stillwater														
Treasure														
Yellowstone														
District #11		8.1	33.6				41.4							
Carter						0.2	1.2							
Custer														
Fallon														
Powder River		24.2				7.4	9.1				2.2			
Rosebud						22.6	64.9	1.0			2.2			
District #12		24.2				30.2	75.2	1.0			2.2			
Statewide	21.5	109.0	62.1			189.6	491.4	1.0		0.2	56.4			

By reference to the table we find widths under 16 feet, in Flathead, Lincoln, Roosevelt, Fergus, Broadwater, Lewis & Clark, Sanders, Meagher, Park, Carbon, and Powder River counties. In the main, these roads serve traffic in the lower ranges, Broadwater and Carbon counties being the notable exceptions. Practically all the surfaced mileage falls in the width group (16-26). It is to be noted,however, that of the total mileage falling in this group, 198.0 miles are served by widths not greater than 16 feet. The incidence of this interval of borderline deficiency is confined to roads of secondary importance in the countries as shown in Table 7B supplementing Table 7A and following immediately hereafter.

Table 7B

INTERNAL DISTRIBUTION OF SURFACE WIDTHS IN THE WIDTH GROUP 16-26

County	Width Groups (16-26)											
	Paved				Surfaced				All Surfaced Roads			
	16	18	20	Over 20	16	18	20	Over 20	16	18	20	Over 20
Flathead		46.4	21.9	0.1	22.3	7.8	34.4	20.3	22.3	54.2	56.3	20.4
Lake		26.3	28.8			24.1				50.4	28.8	
Lincoln			2.7		3.1	19.2	10.2	15.3	3.1	19.2	12.9	15.3
District #1		72.7	53.4	0.1	25.4	51.1	44.6	35.6	25.4	123.8	98.0	35.7
Blaine		5.7	6.5	6.4		30.3	5.2			36.0	11.7	6.4
Glacier		11.4	15.3			39.3	26.2	60.2		50.7	41.5	60.2
Hill		8.1	14.3			35.7	4.6	18.2		43.8	18.9	18.2
Liberty		10.0	1.0		6.4	7.3			6.4	17.3	1.0	
Toole			15.6			35.5	21.5	16.1		33.5	37.1	16.1
District #2		35.2	52.7	6.4	6.4	146.1	57.5	94.5	6.4	181.3	110.2	100.9
Daniels						29.4	7.3	10.2		29.4	7.3	10.2
Phillips			7.4	17.3				28.8			7.4	46.1
Roosevelt			0.7			42.2	41.1	43.2		42.2	41.8	43.2
Sheridan				12.0		28.9		21.6		28.9		33.6
Valley				20.4			14.2	63.1			14.2	83.5
District #3			8.1	49.7		100.5	62.6	166.9		100.5	70.7	216.6
Dawson			20.7			52.8	6.9	23.8		52.8	27.6	23.8
McCone						7.6	19.4	28.1		7.6	19.4	28.1
Prairie						0.3		28.1		0.3		28.1
Richland			10.0	3.8		36.9	0.1	4.9		36.9	10.1	8.7
Wibaux	2.6		6.3				2.3		2.6		10.6	
District #4	2.6		39.0	3.8		97.6	28.7	84.9	2.6	97.6	67.7	88.7
Fergus		22.5		11.7	42.9	28.8			42.9	51.3		11.7
Garfield						45.2	7.0	60.8		45.2	7.0	60.8
Petroleum						27.1		13.0		27.1		13.0
District #5		22.5		11.7	42.9	101.1	7.0	73.8	42.9	123.6	7.0	85.5
Cascade		26.7	19.3		12.2	68.2	19.0	28.5	12.2	96.9	38.3	28.5
Chouteau						66.4		4.9		66.4		4.9
Judith Basin		10.1		8.6			24.6	14.1		10.1	24.6	22.7
Pondera						17.2	31.2	3.8		17.2	31.2	3.8
Teton			0.6			48.6	22.1	20.2		48.6	22.7	20.2
District #6		38.8	19.9	8.6	12.2	200.4	96.9	71.5	12.2	239.2	116.8	80.1
Broadwater		6.0	0.1	9.4	10.9	23.0	22.6	0.4	10.9	29.0	22.7	9.8
Jefferson		13.4	85.2	1.5		4.6	0.9			18.0	86.1	1.5
Lewis & Clark		6.6	33.4	7.9	34.1	17.5	23.9	4.3	34.1	24.1	57.3	12.2
District #7		26.0	118.7	18.8	45.0	45.1	47.4	4.7	45.0	71.1	166.1	23.5

Table 78

INTERNAL DISTRIBUTION OF SURFACE WIDTHS IN THE WIDTH GROUP 16-26

County	Width Groups (16-26)											
	Paved				Surfaced				All Surfaced Roads			
Granite		28.1	8.4	8.5		5.9	3.1	15.0		34.0	11.5	23.3
Mineral		29.2	0.1			24.7	24.5	0.6		53.9	24.6	0.6
Missoula		41.2	29.7	5.0	6.5	14.5			6.5	55.7	29.7	5.0
Powell		51.5	5.0	5.4						51.5	5.0	5.4
Ravalli		44.2						6.9		44.2		6.9
Sanders		15.5	13.4			18.7	39.0	12.6		34.2	52.4	12.6
District #8		209.7	56.6	18.7	6.5	63.8	66.6	35.1	6.5	273.5	123.2	53.8
Beaverhead		85.9								85.9		
Deer Lodge		22.5	16.4				3.5			22.5	19.9	
Madison		15.4	5.2	2.2		4.9	66.8	9.7		20.3	72.0	11.9
Silver Bow		31.6	10.3	13.8				3.9		31.6	10.3	17.7
District #9		155.4	31.9	16.0		4.9	70.3	13.6		160.3	102.2	29.6
Gallatin		28.7	10.7	10.1	9.5	17.3	2.3		9.5	46.0	13.0	10.1
Meagher					1.8	45.6	4.5	25.5	1.8	45.6	4.5	25.5
Park	0.1	54.5	19.0	0.2	33.6	2.6	3.6		33.7	57.1	22.6	0.2
Sweet Grass		12.9	23.5							12.9	23.5	
Wheatland						44.4				44.4		
District #10	0.1	96.1	53.2	10.3	44.9	109.9	10.4	25.5	45.0	206.0	63.6	35.8
Big Horn						22.4		56.1		22.4		56.1
Carbon		4.2				54.5		25.8		58.7		25.8
Golden Valley			16.1			6.9		5.1		6.9	16.1	5.1
Musselshell						36.6	6.5	20.0		36.6	6.5	20.0
Stillwater		24.1	9.3	4.7						24.1	9.3	4.7
Treasure			28.7								28.7	
Yellowstone		5.2	5.3			75.9	1.5	39.6		71.1	6.8	39.6
District #11		33.5	59.4	4.7		196.3	8.0	146.6		229.8	67.4	151.3
Carter					11.6		31.5	6.9	11.6		31.5	6.9
Custer		14.4	13.0		0.2	71.9	47.4	13.6	0.2	86.3	60.4	13.6
Fallon				3.4			18.5	8.4			18.5	11.8
Powder River						14.0		18.5		14.0		18.5
Rosebud		25.5			0.2	27.8		18.2	0.2	53.3		18.2
District #12		39.9	13.0	3.4	12.0	113.7	97.4	65.6	12.0	153.6	110.4	69.0
Statewide	2.7	729.8	505.9	152.2	195.3	1230.5	597.4	818.3	192.0	1960.3	1103.3	970.5
Percentum	0.2	42.4	36.4	11.0	6.9	43.3	21.0	28.8	4.7	48.1	26.1	22.9

2.036 Comparisons of the Use of the Rural Federal Aid System With That of the State Secondary System

Under the conditions imposed in the operation of the Federal Highway Act the System designed for improvment is restricted to a mileage not exceeding 7% of the total road mileage of the state, plus those portions of the System which lie within National Reservations. By so restricting the mileage the Act necessitates the classification of a connected system of roads, that is, one of statewide and national interest rather than one of individual community interest. In designing the system, many roads tributary to densely populated communities and bearing comparatively large volumes of traffic were left off for the reason that they were not characteristically system roads, i.e., they were not arterial highways convenient to through traffic, nor was the traffic sustained over a significant mileage. Such roads are projected for this report as a part of the State Secondary System to include improved National Recovery Secondary Roads, improved Works Progress Administration Roads, improved Federal Aid Roads off the 7% System and unimproved county roads. Traffic as a whole on the State Secondary System is considerably less than that maintained on the Federal Aid System. However, as a means of evaluating the use of the Federal Aid System with respect to the next lesser system comparisons are drawn out in Table 8 to show significant lengths on the Federal Aid System bearing relatively low volumes of traffic as opposed to significant lengths on the Secondary System carrying relatively high volumes of traffic.

As brought out in Section 2.033 of the report, the average value of the group interval with which we have the greatest single corresponding mileage is 150 and further it was specified that this value was representative of the lower limits of the higher traffic volumes on the State Secondary System. The map, Plate IV, shows sections of the State Secondary System which bear traffic in excess of 150 units per day, also sections of the Federal Aid System which bear less than 150, vehicles per day. Interesting data which may be presented in connection with the comparisons are as follows:

TABLE 8

State Secondary Roads Which Bear Traffic Volumes in an Amount Exceeding That Carried By Low Traffic Roads On The Federal Aid System		
Service Classifications	Length	Average Traffic
Feeder or Secondary roads which serve to extend or facilitate existing transport facilities	138.8	347
Farm-to-market Roads	88.8	221
Total State Secondary System	227.6	298

Roads On The Federal Aid System Improved and Unimproved Which Carry Traffic Less Than That Maintained On High Traffic Roads Of The State Secondary System		
Service and Type Classification	Length	Average Traffic
Improved Sections Serving Inter-county Traffic and Isolated Sections Of The Lesser Through Routes	1007.7	94
Unimproved Sections Serving As The Present Traveled Way and Connecting Inter-county Designated Routes	722.9	42
Total	1730.6	72

We find that those sections of the State Secondary System bearing traffic in excess of that carried by a significant length of the Federal Aid System are those serving farm-to-market traffic in the vicinity of the larger trading centers of the state and those which serve to facilitate existing transport systems. In practically all instances these roads are those which have been improved by state and federal agencies.

Opposed to the high traffic roads on the State Secondary System we find low traffic roads on the Federal Aid System to be those now serving as inter-county roads. Of the total unimproved mileage on the Federal Aid System (738.6 miles), about 98% serves less than 150 vehicles per day; of the total improved mileage, (4680.4 miles), about 21.5% serves less than 150 vehicles per day. Apparent deficient intervals on the improved section exist in isolated sections of the state quite well removed from interstate commercial and recreational tendencies on the part of the traveling public. In use these roads serve local people in the main and in one way the roads could be said to exist as feeder roads. Unimproved sections of the Federal Aid System are those now serving as the traveled way and here again the roads serve principally for the convenience of the State residents.

Plate IV on the following page sets forth data respecting relative use of the several rural road systems.

2.04—The State Secondary System The State Secondary System for purposes of this report is one subordinate to the Federal Aid or Seven Percent System. Strictly speaking, the System is one which is neither sanctioned nor approved in whole by any administrative agency. It is, however, a system which now serves farm-to-market traffic and traffic essentially local in characteristic, the West Gallatin road in Gallatin County being the notable exception. This road now serves as a tributary link between sections of the Federal Aid System. Contrary to the conception of the Federal Aid System, greatest emphasis is not placed on the word system, since terminals are not necessary ad-

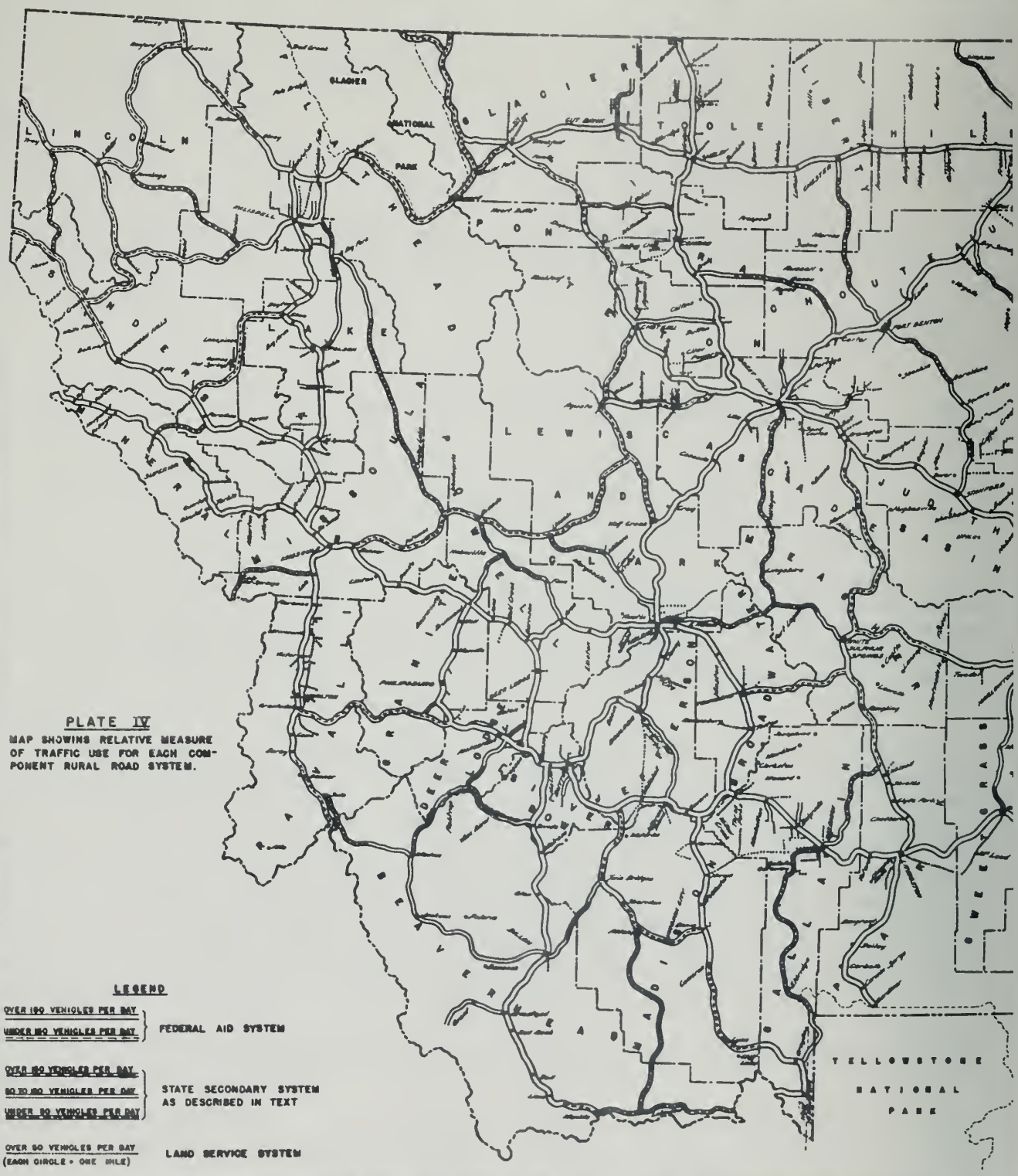
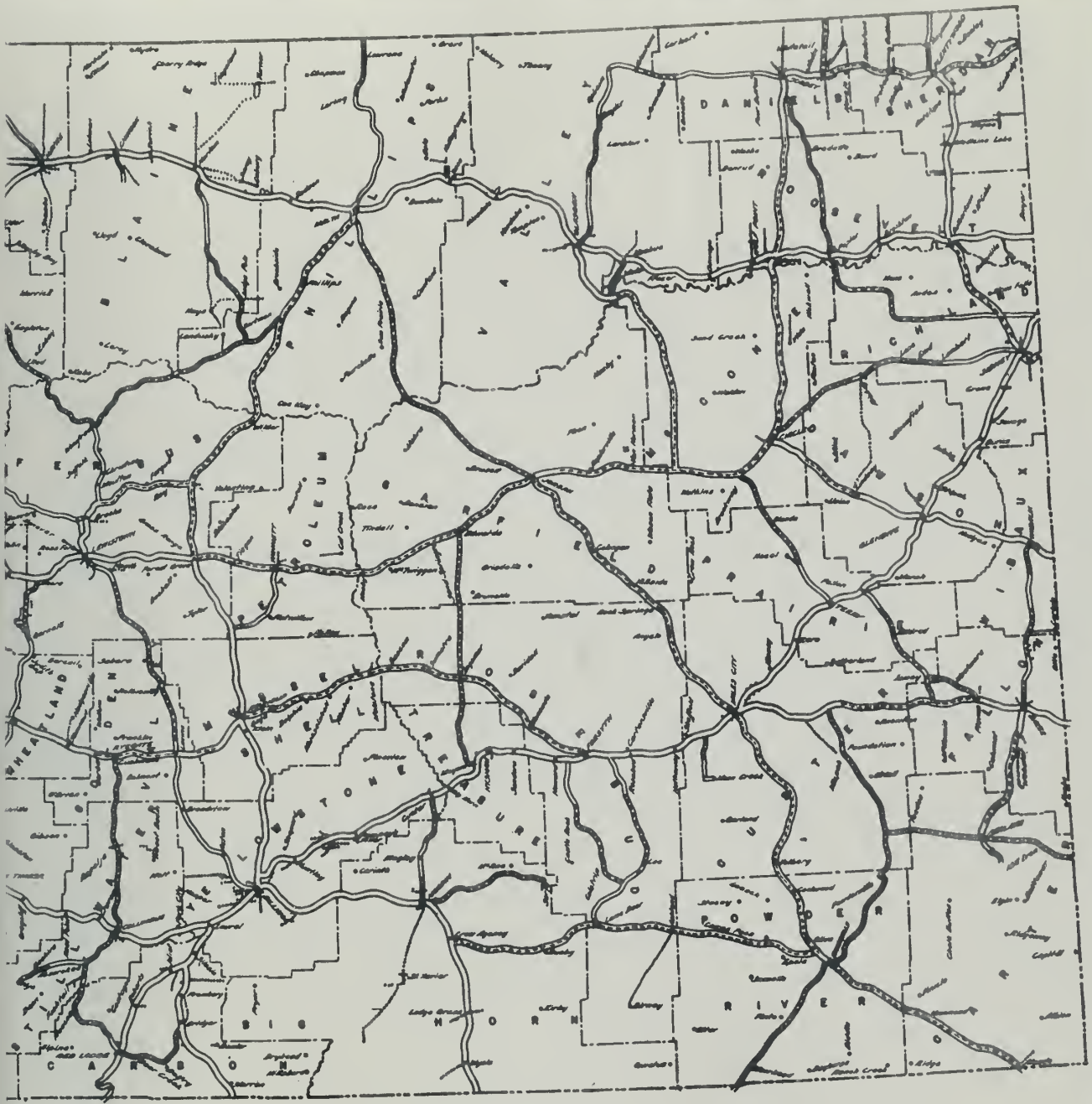
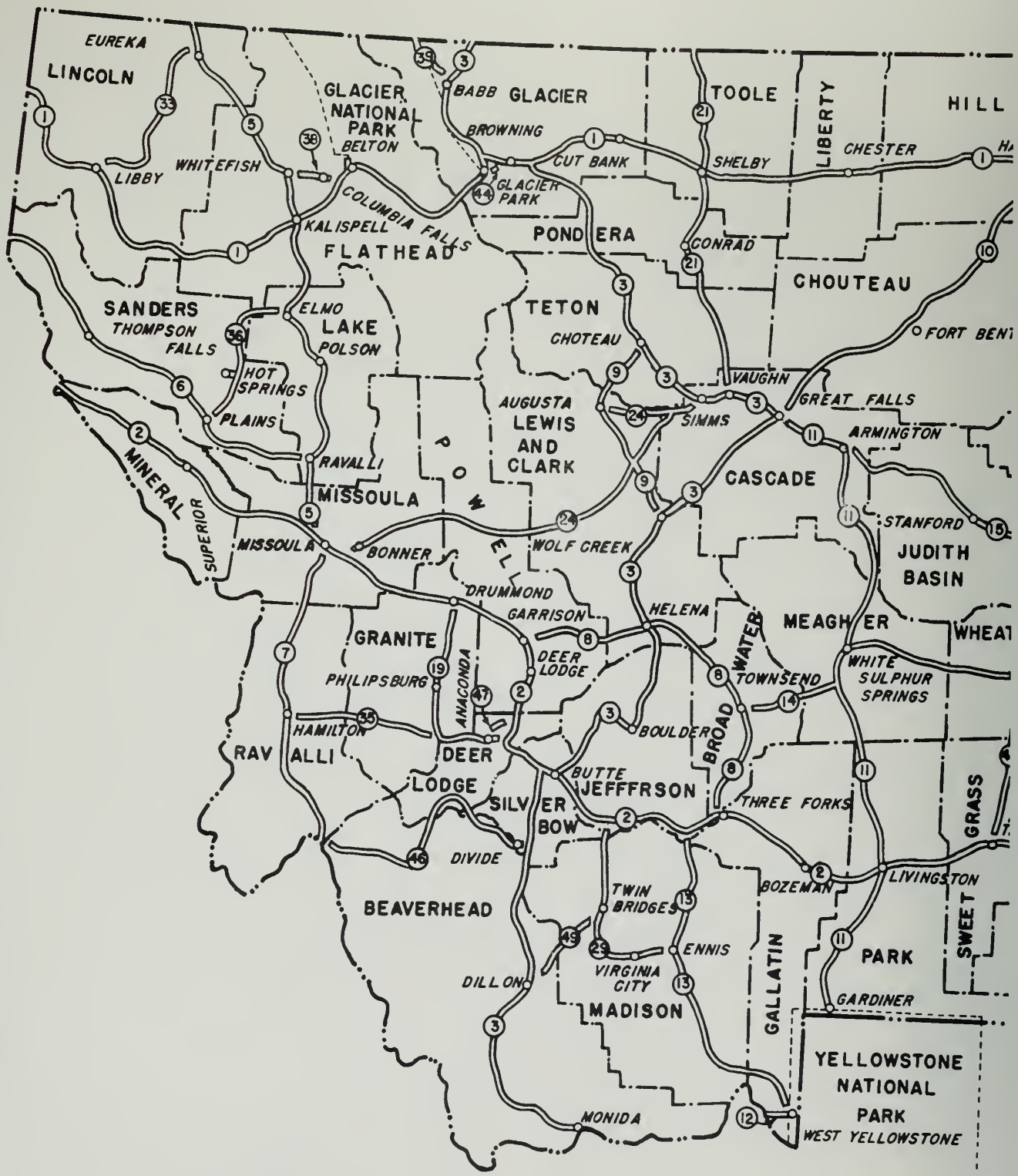


PLATE IV

MAP SHOWING RELATIVE MEASURE OF TRAFFIC USE FOR EACH COMPONENT RURAL ROAD SYSTEM.


DANIELS
ROOSEVELT
SHERIDAN
MCCONE
PRAIRIE
WIBAUX
FALLON
CARTER
POWDER
RIVER



MAP OF

MONTANA

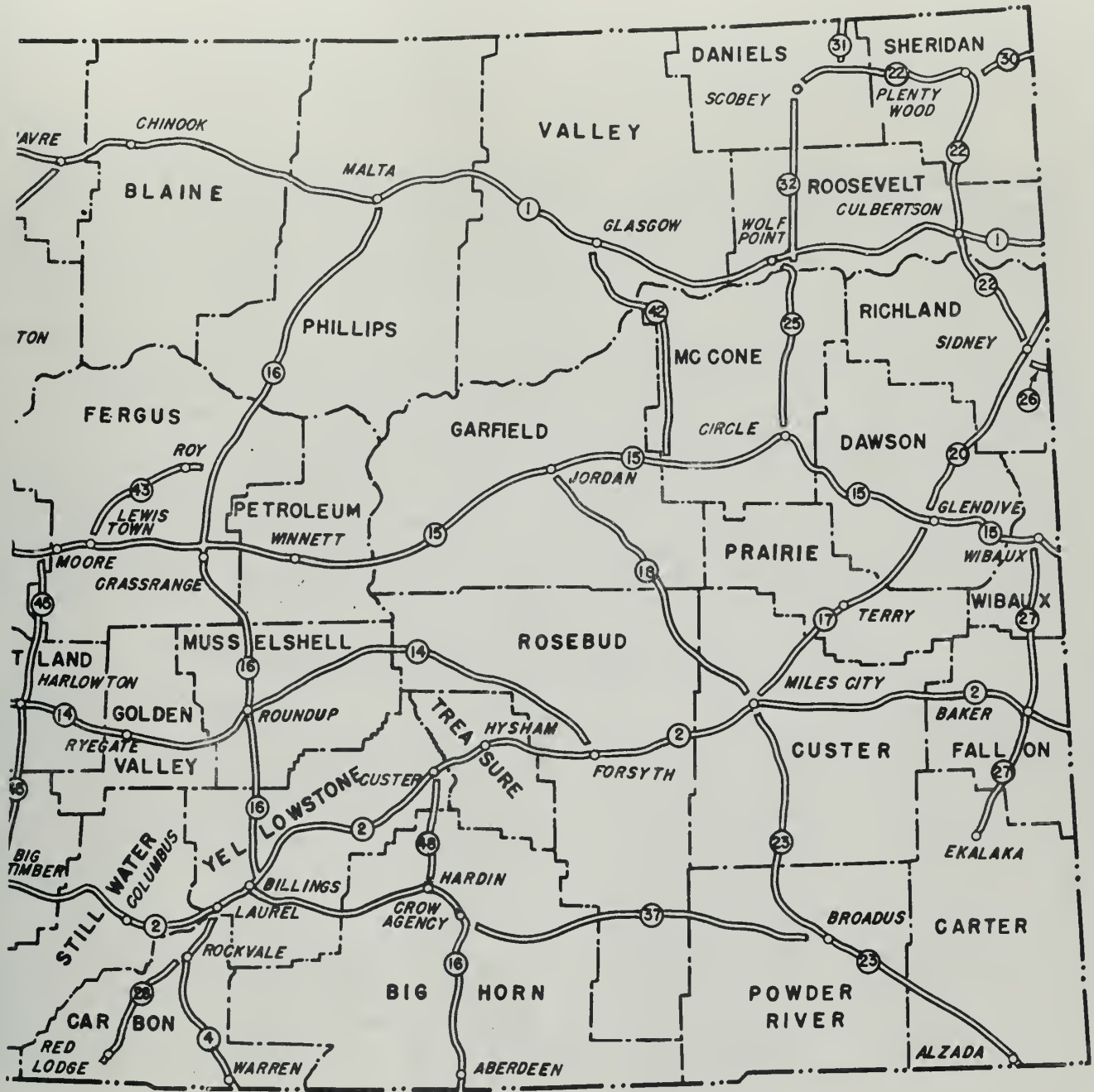
SHOWING

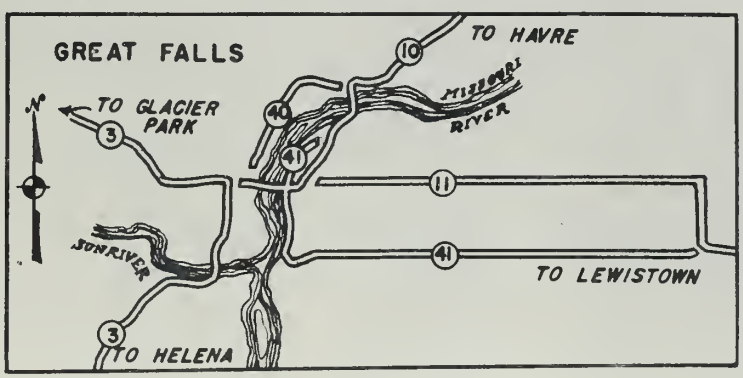
SEVEN PERCENT SYSTEM

WITH FEDERAL AID ROUTE NUMBERS

HIGHWAY PLANNING SURVEY

REVISED JULY 10, 1941


DANIELS
SHERIDAN
SCOBEY
PLENTY WOOD
VALLEY
CHINOOK
MALTA
BLAINE
ROOSEVELT
CULBERTSON
GLASGOW
WOLF POINT
RICHLAND
SIDNEY
PHILLIPS
MC CONE
FERGUS
GARFIELD
CIRCLE
DAWSON
ROY
JORDAN
GLENDIVE
LEWIS TOWN
PETROLEUM
WINNETT
PRAIRIE
WIBAUX
MOORE
GRASSRANGE
TERRY
MUSSELSHELL
ROSEBUD
HARLOWTON
MILES CITY
GOLDEN VALLEY
ROUNDUP
TREASURE
HYSHAM
BAKER
RYEGATE
FORSYTH
CUSTER
FALLON
YELLOWSTONE
CUSTER
BIG TIMBER
STILLWATER
COLUMBUS
EKALAKA
BILLINGS
HARDIN
LAUREL
CROW AGENCY
BROADUS
CARTER
ROCKVALE
BIG HORN
POWDER RIVER
CARBON
RED LODGE
WARREN
ABERDEEN
ALZADA


GREAT FALLS
TO HAVRE
TO GLACIER PARK
MISSOURI RIVER
SUNRIVER
TO LEWISTOWN
TO HELENA

junctions of the group proposed for discussion. As designed the System comprises improved projects built under the provisions of the old Federal Aid Road Act of 1916, improved National Recovery Secondary Roads, improved Works Program Roads designated WPSS and WPSO, improved Works Program Roads designated WPMS and WPGS, improved Forest Highway Roads, improved National Parks Highways, National Indian and Military Reservation Roads and County Roads along the system as designed or projected. The map, Plate IV, shows the System as projected in detail. The narrow bands designated State Secondary System comprise the System under discussion.

Each of the several program designations, FAP, NRS, WPSO, etc., connotes especial significance with respect to the selection of the routes and their administration. While discussion is directed toward analysis of the State Secondary System as a whole, there are many important features relating to the program designations which are set forth hereinafter and merit consideration.

2.0411 **Federal Aid Projects Off The Federal Aid System**

Under the provision of the original Federal Aid Road Act of 1916, highway construction under the administration of the State Highway Department was restricted to a system of rural post roads over which the United States mails were transported. This feature of the Act inhibited complete systematic growth of arterial highways, interstate in character in that the most important connecting routes paralleled railroads which themselves were carrying mail, hence the program in many instances was directed away from the railways, and, while at the time the highways were built they were essentially mail routes, they also served then and later as a medium of highway transport for farm-to-market (railway siding) traffic. A tabulation Table 9, showing these sections follows hereinafter:

TABLE 9

ORIGINAL FEDERAL AID PROJECTS ON STATE SECONDARY SYSTEM

Project Number	Name	County	Type	Length	
				Rural	Urban
3	Black and White Trail	Carbon	Plain Macadam	(2.7)	
5	Hardin-Custer	Big Horn	Graded & Drained	2.0	
16	Forsyth-Ashland	Rosebud	Plain Macadam	(3.8)	
39	Bell Crossing	Ravalli	Plain Gravel (Bridge 0.07)	(0.3)	
40	Belgrade-Maudlow	Gallatin	Plain Macadam (Bridge 0.01)	(2.8)	
41	Manhattan No. 1 Ranch	Gallatin	Plain Macadam	5.0	
49A	County Road No. 1	Meagher	Plain Gravel	(10.4)	
52	Lower Polytechnic Road	Yellowstone	Concrete	(2.0)	
53A	Ballantine Spur	Yellowstone	Plain Macadam	(1.0)	
	Cemetery Road	Yellowstone	Low Type Bituminous	(2.3)	
69A	Whitehall Paving	Jefferson	Paved		(0.2)
76	Gallatin Canyon	Gallatin	Plain Macadam (Bridge 0.03)	5.8	
79	Sieps Bridge	Roosevelt	Bridge 0.02		
80	Savoy Creek Bridge	Blaine	Bridge 0.03		
83	Hinsdale-Thoeny	Valley	Plain Macadam	(1.9)	
83	Hinsdale-Thoeny	Valley	Reconstruction	(1.9)	
99	Columbia Falls South	Flathead	Plain Macadam	(3.8)	
102A	Big Fork North	Flathead	Plain Gravel	(2.4)	
129	Pershing Creek Hill	Stillwater	Plain Gravel	(1.5)	
150	Noxon Bridge	Sanders	Plain Gravel (Bridge 0.14	(0.4)	
203	Huffine Lane	Gallatin	Plain Macadam (Bridge 0.01	6.5	
209	Belgrade-Salesville	Gallatin	Plain Macadam (Bridge 0.01)	6.0	

Mileage existing as completed under F.A. Program

Concrete	(2.0)	0.2
Low Type Bit.	(2.3)	
Plain Macadam	(16.0)	
Plain Gravel	(15.0)	
Sub Total	(35.3)	(0.2)

Mileage further improved under subsequent programs

Graded & Drained	2.0	
Plain Macadam	23.3	
Sub-Total	25.3	
Sub-Total New Construction	60.6	0.2
Sub-Total Reconstruction	1.9	
Total All Construction	62.5	0.2

As was the case with Federal Aid Projects on the Seven Percent System, these sections have been administered by the Montana Highway Department in cooperation with the Public Roads Administration. Their location has justified extensions and reconstruction in many cases as a result of secondary arterial use.

Funds for the construction of these roads derived from the sources cited in Section 2.031 of this chapter. All construction on these sections of the System was financed prior to the enactment of Initiated Bill No. 31 providing gas tax revenues for use in highway construction.

Responsibility for the maintenance of the Federal Aid Sections of the System rests with the Montana Highway Department.

2.0412--National Recovery Secondary Projects

A system secondary in importance to the Federal Aid System and local in aspect was first recognized as a consequence of the passage of the National Industrial Recovery Act (48-Stat. 200). The rules and regulations governing the administration of this act and the Hayden-Cartwright Act defined the "Secondary or Feeder Roads" as follows:

"Secondary or feeder roads shall include farm-to-market roads, rural free delivery roads, and public school bus routes, and shall be defined as roads which are not included in the approved system of Federal Aid Highways, but which are either part of the State Highway System or are important local highways leading to shipping points, or which will permit the coordination or extension of existing transportation facilities including highway, mail, air and water."

Acting on the premise, several projects, answering the demands of the definition and mutually agreed upon by local, State and Federal Authorities, were designated for construction. The rules and regulations of the Hayden-Cartwright Act further stipulated that not less than 25% of the total appropriation should be applied to the construction of Secondary or feeder roads. The State was not required to match Federal Funds under the provisions of the Act, since its summary intent was the relief of unemployment.

Responsibility for the maintenance of the constructed secondary or feeder roads rests with the State or responsible political subdivision thereof and in Montana's case, was referred to the several counties wherein these projects were constructed.

A tabulation of the national Recovery Secondary Projects is given as follows:

TABLE 10
NATIONAL RECOVERY SECONDARY PROJECTS ON STATE SECONDARY SYSTEM

NRS Project No.	Name	County	Surface Type	Length Miles Rural	Urban
41	Manhattan No. 1 Ranch	Gallatin	Low Type Bituminous	(5.0)	
49B	White Sulphur Sprs. NW	Meagher	Plain Macadam	6.4	0.5
49C	White Sulphur Sprs. NW	Meagher	Plain Gravel	2.0	
76	Gallatin Canyon	Gallatin	Low Type Bituminous	(5.8)	
102B	Big Fork North	Flathead	Plain Macadam	10.0	
102C	Big Fork North	Flathead	Plain Macadam	2.2	
102D	Big Fork South	Flathead	Plain Macadam	2.5	
102D	Big Fork South	Lake	Plain Macadam	2.0	
102E	Big Fork South	Lake	Plain Macadam	2.7	
203	Huffine Lane	Gallatin	Low Type Bituminous	(6.5)	
209	Belgrade-Gallatin Gateway	Gallatin	Low Type Bituminous	(6.0)	
277B	Ice House Approach	Cascade			0.3
279	Brewery By-Pass	Silver Bow	Concrete	1.1	
282	Malta North	Phillips	Plain Macadam	4.5	
283A	Big Timber North	Sweet Grass	Plain Macadam	2.2	0.5
283B	Big Timber North	Sweet Grass	Plain Macadam	2.9	
283D	Big Timber North	Sweet Grass	Low Type Bituminous	0.2	
284A	Lavina South	Golden Valley	Plain Macadam	3.5	
284B	Lavina South	Golden Valley	Plain Macadam	0.6	
284C	Lavina South	Golden Valley	Plain Macadma	1.0	
285A	Divide-Wisdom	Silver Bow	Low Type Bituminous	3.4	
285A	Divide-Wisdom	Beaverhead	Plain Macadam	1.5	
285B	Divide-Wisdom	Beaverhead	Plain Macadam	2.9	
286A	Opheim South	Valley	Plain Macadam	6.4	0.1
286B	Opheim South	Valley	Plain Macadam	4.7	
287	Missoula-Orchard Homes	Missoula	Low Type Bituminous	3.8	0.8
288A	Columbus-Absarokee	Stillwater	Low Type Bituminous	11.7	0.3
288B	Columbus-Absarokee	Stillwater	Low Type Bituminous	7.5	
289	Red Lodge-Absarokee	Carbon	Plain Macadam	1.5	
290A	Fort Benton-Lewistown	Chouteau	Plain Macadam	1.8	
290B	Fort Benton-Lewistown	Chouteau	Plain Macadam	3.4	
291A	Avon-Helmville	Powell	Plain Macadam	5.6	
291B	Avon-Helmville	Powell	Plain Macadam	5.9	
292A	Harlowton South	Wheatland	Low Type Bituminous	0.5	
292A	Harlowton South	Wheatland	Plain Macadam	5.2	
292B	Harlowton South	Wheatland	Plain Macadam	4.9	
293	Anaconda-Warm Springs	Deer Lodge	High Type Bituminous	6.2	
294	Opportunity Feeder	Deer Lodge	Low Type Bituminous	2.4	
295	Fort Benton Feeder	Chouteau	Low Type Bituminous	1.5	
	Non-Participating	Chouteau	Plain Gravel	3.3	
296A	Billings-Broadview	Yellowstone	Low Type Bituminous	1.6	

TABLE 10 (Continued)

NRS Project No.	Name	County	Surface Type	Length Miles	
				Rural	Urban
296B	Billings-Broadview	Yellowstone	Low Type Bituminous	5.1	
297	Butte Air Port	Silver Bow	Low Type Bituminous	0.6	
298	Missoula Air Port	Missoula	Low Type Bituminous	0.6	
299	Helena Air Port	Lewis & Clark	Low Type Bituminous	0.1	1.2
300	Great Falls Air Port	Cascade	Low Type Bituminous	0.8	
301A	Wild Horse Trail	Hill	Plain Macadam	10.0	
301B	Wild Horse Trail	Hill	Plain Macadam	4.5	
302A	Terry-Brockway	Prairie	Plain Macadam	6.9	
302B	Terry-Brockway	Prairie	Plain Macadam	4.5	
303	Chester South	Liberty	Plain Macadam	4.7	0.5
304	Galen West	Deer Lodge	Low Type Bituminous	0.8	
304	Galen West	Deer Lodge	Plain Macadam	2.3	
305	Chouteau Dutton	Teton	Plain Macadam	7.3	
306	Ronan West	Lake	Plain Macadam	6.5	0.3
307A	Stanford North	Judith Basin	Plain Macadam	6.7	0.7
307B	Stanford North	Judith Basin	Plain Macadam	3.4	
308A	Ismay South	Custer	Plain Macadam	1.8	0.1
308A	Ismay South	Fallon	Plain Macadam	2.2	
308B	Ismay South	Fallon	Plain Macadam	2.0	
309A	Lewistown-Denton	Fergus	Plain Macadam	4.1	
309B	Lewistown-Denton	Fergus	Plain Macadam	3.1	
310	Pendroy West	Teton	Plain Macadam	1.7	
311	Chinook-Bear's Paw	Blaine	Low Type Bituminous	0.3	
311	Chinook-Bear's Paw	Blaine	Plain Gravel	5.8	
312	Great Falls North	Cascade	Plain Macadam	7.6	
313	Plentywood North	Sheridan	Plain Macadam	8.7	
314	Wibaux South	Wibaux	Plain Macadam	5.9	1.2
316A	Cut Bank North	Glacier	Low Type Bituminous	4.5	
316B	Cut Bank North	Glacier	Low Type Bituminous	5.0	
316B	Non-Participating	Glacier	Low Type Bituminous	0.2	0.1
317	Broadus Southwest	Powder River	Plain Gravel	4.2	
318	Ekalaka Southeast	Carter	Plain Macadam	4.8	
320	Carlson Bridge	Carbon	Plain Gravel	0.3	
321A	Valier West	Pondera	Plain Macadam	4.9	
321B	Valier West	Pondera	Plain Macadam	6.2	
322	Hardin-Sarpy	Big Horn	Plain Macadam	3.0	
323A	Armell's Creek Road	Rosebud	Plain Macadam	5.1	
323B	Armell's Creek Road	Rosebud	Plain Macadam	5.2	
324	Roundup West	Musselshell	Plain Gravel	4.3	
327	Fairview West	Richland	Plain Macadam	0.7	0.8
329A	Great Falls South	Cascade	Plain Macadam	3.6	
329B	Great Falls South	Cascade	Plain Gravel	2.3	
329B	Great Falls South	Cascade	Plain Macadam	2.7	
331A	Winnett South	Petroleum	Plain Macadam	5.2	
332	Nashua Fort Peck	Valley	Low Type Bituminous	5.4	

Further Improving Previously Improved Mileage		
Low Type Bituminous	23.3	
Mileage existing as of date January 1, 1938		
Concrete	1.1	
High Type Bituminous	6.2	
Low Type Bituminous	56.0	4.0
Plain Macadam	219.6	3.4
Plain Gravel	22.2	
Sub-Total	305.1	7.4
Total	328.4	7.4

2.0413--Works Program Highway Secondary Projects

Following the NIRA appropriations, the 74th Congress enacted the Emergency Relief Appropriation Act of 1935 which deviated somewhat from previous programs in that additional monies were allocated for expenditure on secondary or feeder roads. Administrative controls remained the same as those cited in the Paragraph 2.0412. However, as a function of administrative procedure, the roads were divided into three classes and defined as follows:

(1) "Roads outside of municipalities or metropolitan areas which are not included in the Federal Aid Highway System, or the State Highway System in states which have not taken responsibility for important county or township or roads of similar classification (WPSO).

(2) "Roads outside of municipalities or metropolitan areas which are a part of the State Highway System but not included in the Federal Aid Highway System (WPSS).

(3) "Roads or streets within municipalities or metropolitan areas which are not included in the Federal Aid Highway System (WPMS)."

It is well to bring forth at this time that no legislation was advanced tending to establish complete systematic growth of a connected network of secondary roads. Considerations involved in the choice of secondary roads for improvement were controlled by traffic expediency, that is to say, given a road of relatively high traffic volume in a community, let us then improve the road to serve the greatest number of road users. This procedure, while apparently loose and disordered from the standpoint of systematic growth and designation, has its practical limiting factors in that high traffic volumes, i.e., direct user benefits will govern during the pioneering stages of the secondary system development.

Responsibility for the maintenance of sections improved under the Act rests with the State Highway Department or a political sub-division of the State. As was the case with National Recovery Secondary Projects this obligation was referred to the County authorities.

Funds for the construction of these projects were applied as follows:

(1) Not less than 25% of the funds apportioned the State were applied to the secondary or feeder roads of the first classification (WPSO).

(2) Not less than 25% of such funds (The emergency appropriation in total) were applied to projects within municipalities or metropolitan areas located on the Federal Aid Highway System or extensions thereof (WPMH), or on the secondary or feeder roads of the third classification (WPMS).

(3) The remaining percentage of the apportionment was applied to projects on the Federal Aid Highway System or to Secondary or Feeder Projects of the second classification located on the State Highway System, but not included in the Federal Aid Highway System (WPSS).

The record of the improvement of the secondary or feeder roads built under the provisions of the Act is as follows:

TABLE 11A
WPSO PROJECTS ON STATE SECONDARY SYSTEM

Project No.	Name	County	Surface Type	Length	
				Miles	Traffic
335B	Malta North	Phillips	Plain Macadam	2.4	193
336	Great Falls North	Cascade	Plain Macadam	2.4	48
336	Great Falls North	Chouteau	Plain Macadam	3.0	25
337	Malta North	Phillips	Plain Macadam	3.5	83
338	Lavina South	Golden Valley	Plain Macadam	6.2	56
338	Lavina South	Yellowstone	Plain Macadam	2.2	54
339	Chester South	Liberty	Plain Macadam	5.1	32
340	Chinook-Bears Paw	Blaine	Plain Gravel	5.0	57
341	Choteau-Dutton	Teton	Plain Macadam	5.5	55
342	Denton-Brooks	Fergus	Plain Macadam	3.1	99
343	Avon-Helmville	Powell	Plain Macadam	2.8	50
344	Twin Bridges-Dillon	Beaverhead	Plain Macadam	2.6	95
345	Wibaux-Baker	Wibaux	Plain Macadam	4.4	90
346	Red Lodge-Absarokee	Carbon	Plain Macadam	0.5	32
346	Red Lodge-Absarokee	Stillwater	Plain Macadam	2.3	42
347	Ekalaka Southeast	Carter	Plain Macadam	2.3	44
348	Highwood Road	Cascade	Plain Gravel	2.7	48
348	Highwood Road	Chouteau	Plain Gravel	1.0	29
349	Fort Benton-Lewistown	Chouteau	Plain Macadam	2.8	32
350	Moon Creek Road	Custer	Plain Macadam	2.9	15
350B	Moon Creek Road	Custer	Plain Macadam	5.3	8
352	Anaconda-Ralston	Deer Lodge	Plain Macadam	1.1	54
354	Philipsburg-Skalkaho	Granite	Plain Macadam	2.4	111
355	Joplin North	Liberty	Plain Macadam	4.9	92
356	Winnett South	Petroleum	Plain Macadam	5.5	54
357B	Valier East & West	Pondera	Plain Macadam	3.5	118
360B	Rattlesnake Gulch	Missoula	Low Type Bituminous	2.6	307
361	Fairview West	Richland	Plain Macadam	3.9	115
361B	Fairview West	Richland	Plain Macadam	6.3	71
362	Colstrip-Lame Deer	Rosebud	Scoria Surfaced*	2.6	35
364	Basin Reservoir	Silver Bow	Low Type Bituminous	3.8	95
365	Big Timber North	Sweet Grass	Plain Macadam	2.9	159
366	Sweet Grass West	Toole	Plain Macadam	3.7	28
367	Hysham-Ingomar	Treasure	Plain Macadam	3.1	65
368	Opheim South	Valley	Plain Macadam	2.3	69
370	Bridger Canyon Road	Gallatin	Plain Macadam	1.8	104
			Low Type Bituminous	6.4	181
			Plain Macadam	100.7	69
			Plain Gravel	8.7	51
			Scoria Surfacing*	2.6	35
				118.4	74

* Place Scoria Surfaced Mileage with Plain Gravel

TABLE 11B
WPSS PROJECTS ON THE STATE SECONDARY SYSTEM

Project No.	Name	County	Surface Type	Length Rural	Length Urban
5A	Hardin-Custer	Big Horn	Plain Macadam (FAP5)	(2.0)	
5B	Hardin-Custer	Big Horn	Plain Macadam	1.3	

	Further Improving Mileage	Previously Improved
	Plain Macadam	2.0
New Construction		
	Plain Macadam	1.3
Total Mileage		3.3

TABLE 11C
WPMS PROJECTS ON THE STATE SECONDARY SYSTEM MODIFYING
PREVIOUS FEDERAL AID PROGRAMS

Project No.	Name	County	Surface Type	Lengths Mile Rural	Lengths Mile Urban
52	Lower Polytechnic	Yellowstone	Concrete (Widening)	(2.0)	
357	Valier east	Pondera	Plain Macadam		1.1

Widening (FAP52)	(2.0)	
New Mileage (Plain Macadam)		1.1
Total Mileage	(2.0)	1.1

TABLE 11D
WPMS PROJECTS ON THE STATE SECONDARY SYSTEM
(Initial Construction)

Project No.	Name	County	Surface Type	Lengths Mile Rural	Lengths Mile Urban
360A	Rattlesnake Gulch	Missoula	Low Type Bituminous	0.8	
371	Fourth St. Anaconda	Deer Lodge	Low Type Bituminous	1.6	
335A	Saco North	Phillips	Plain Macadam		0.3
372	State Capitol Approach	Lewis & Clark	Concrete		0.8
373	Hysham Streets	Treasure	Low Type Bituminous		0.6
374B	Orange St. By-Pass	Missoula	Low Type Bituminous		0.2
378	Wyoming Ave. Butte	Silver Bow	High Type Bituminous		0.4
379	Maine St., Butte	Silver Bow	High Type Bituminous		0.2
381	Arizona St., Butte	Silver Bow	High Type Bituminous		0.2

Sub-Total	2.4	2.7
Total Mileage on County Trunk Sys.		
	2.4	3.8

2.0414 Works Program Grade Crossing Secondary Projects (WPGS)

In conjunction with the Emergency Relief Appropriation Act of 1935 (Pub. Res. No. 11-74th. Congress) funds were allotted providing for the elimination of hazards to life at railroad grade crossings. The rules and regulations stipulate that grade crossing construction would be "limited to work actually necessary and performed within 1500 feet on each side of the nearest track of the crossing, measured along the centerline of the highway improvement." As a consequence of this limitation a considerable section was added to the length of secondary roads when viewed in the aggregate. Table 12A lists grade crossing eliminations constructed under the provisions of the Act on secondary or feeder roads:

TABLE 12A
WPGS PROJECTS ON STATE SECONDARY SYSTEM MODIFYING OR EXTENDING PREVIOUS PROGRAMS

Project No.	Name	County	Surface Type	Length Mile	
				Rural	Urban
283C	Big Timber North	Sweet Grass	Low Type Bituminous (Under-Pass)	0.4	
301C	Wild Horse Trail	Hill	Concrete	0.2	
			Total New Mileage	0.6	

TABLE 12B
WPGS PROJECTS ON STATE SECONDARY SYSTEM
(Initial Construction)

Project No.	Name	County	Surface Type	Length Mile	
				Rural	Urban
377	Whitefish Over-Pass	Flathead	Low Type Bituminous	0.4	
376	Lyndale Ave. Helena	Lewis & Clark	Low Type Bituminous		0.4
374A	Orange St. By-Pass	Missoula	Low Type Bituminous		0.2
			Sub-Total	0.4	0.6
		Total Mileage on County Trunk System		1.0	0.6

2.0415--National Forest Highways

Beginning with the original Federal Aid Road Act of 1916 funds have been allotted for the construction and maintenance of roads lying within or partly within the National Forests. Section 5 of the Rules and Regulations for Administering Forest Roads and Trails states that the Forest Highway Program shall be qualified as follows:

(1) Construction correlation with adjacent Federal and State road programs.
(2) The interests of communities within, adjoining or adjacent to National

Forests.

(3) Service to the National Forests by increasing their value and usefulness.
(4) The economy of continuity of operation.
(5) Benefit to forest development protection and administration
(6) Amount of available cooperative funds.

Excluding the first qualifications, that relating to construction of Forest Highways on the Federal Aid System, the forest highway program is directed toward an end similar to that comprehended in other national legislation relating to secondary and feeder highways in the several states affected, hence all improved forest highways other than those on Federal Aid System have been placed, for purposes of this report, on the State Secondary System.

Forest Highway Funds are apportioned one-half in the ratio that the area of National Forest land in any state bears to the total area of such land in all states, and one-half in the ratio that the value of National Forest land in any state bears to the total value of such land in all states. There is no limiting clause in the Rules and Regulations with respect to apportionment of funds between those sections of the Forest Highway System on the Federal Aid Highway System and those sections which are not on the Federal Aid System. Ultimate development of the forest highway system rests with the discretionary action of the Public Roads Administration, the Forest Service and the State Highway Department.

Construction activities are supervised by the Public Roads Administration working in consonance with the United States Forest Service and the State Highway Department. Responsibility for the maintenance of sections coincident with the State Secondary System devolves upon the State organization, two years' after construction.

The tabulation of the forest highway program development on the State Secondary System is as follows:

TABLE 13A
NATIONAL FOREST HIGHWAY PROJECTS ON STATE SECONDARY SYSTEM
"Projects Improved to Acceptable Standards"

Project No.	Name	County	Surface Type	Length Mile	
				Rural	Urban
14A	East Side Flathead Lake	Lake	Low Type Bituminous	4.6	
14B	East Side Flathead Lake	Lake	Low Type Bituminous	1.0	
$42A_2$	West Gallatin	Gallatin	High Type Bituminous	4.2	
$42A_1B_1$	West Gallatin	Gallatin	High Type Bituminous	3.4	
42C	West Gallatin	Gallatin	High Type Bituminous	0.2	
$42B_3C_1D_1E_2$	West Gallatin	Gallatin	High Type Bituminous	5.4	
$42B_2F_1H_1$	West Gallatin	Gallatin	High Type Bituminous	0.1	
$42E_1F_1GH_1I_1$	West Gallatin	Gallatin	High Type Bituminous	7.0	
42J	West Gallatin	Gallatin	High Type Bituminous	7.0	
42K	West Gallatin	Gallatin	High Type Bituminous	9.8	
$42L_2L_1$	West Gallatin	Gallatin	High Type Bituminous	3.7	
$42MM_1$	West Gallatin	Gallatin	High Type Bituminous	2.6	

Total Low Type Bit.	5.6
Total High Type Bit.	43.4
Total Mileage	49.0

Table 138

NATIONAL FOREST HIGHWAYS ON THE STATE SECONDARY SYSTEM

County	Name	Surface Types									
		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Total	
		Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.
Lake	Swan Lake-Seeley Lake							32.8	24	32.8	24
Lincoln	Marion-Jennings							33.7	3	33.7	3
	Sull Lake Road	6.1	16							6.1	16
Broadwater	Helena-White Sulphur Springs							7.7	2	7.7	2
Mineral	St. Regis-Paradise			8.5	44					8.5	44
Missoula	Clearwater North							35.8	13	35.8	13
	Lolo West							17.2	18	17.2	18
Sanders	Paradise-St. Regis			5.0	16			9.8	16	14.8	16
	Sull Lake Road							18.3	24	18.3	24
Beaverhead	Gibbons Pass-Dillon			2.0	104			11.4	22	13.4	34
Gallatin	Bridger Canyon							8.8	49	8.8	49
Meagher	Helena-White Sulphur Springs							2.1	13	2.1	13
Sub-Totals		6.1	16	15.5	43			177.6	17	199.2	19
Carter	Ekalaka Southeast							2.6	56	2.6	56
Sub-Total								2.6	56	2.6	56
	Nat'l. Forest Development Roads										
Phillips	Harlem-Zortman	4.2	43					5.0	43	9.2	43
Beaverhead	Gibbons Pass-Dillon							7.5	19	7.5	19
	Red Rock Lake North							3.5	1	3.5	1
Madison	Ruby South							23.7	9	23.7	9
Carter	Ekalaka East							6.4	9	6.4	9
Sub-Total		4.2	43					46.1	14	50.3	16
Grand Total		10.3	27	15.5	43			226.3	17	252.1	19

2.0416 National Military Reservation Roads

Due to the construction of Fort Peck Dam in Valley County, 2.9 miles of roadway were constructed by the U.S. Army Engineers along the Nashua-Fort Peck Road to serve traffic during operations. Construction activities were under the jurisdiction of the Federal Authorities. The surface type is classified as low type bituminous and serves an average traffic of 1420 vehicle units per day per mile.

2.0417--National Indian Reservation Roads

As a function of the Federal administration of the National Indian Reservations, roads are constructed to serve those resident on the Reserves. Some few of these roads serve to connect sections of the State Secondary System, hence they are entered in the discussion as follows:

Table 14

NATIONAL INDIAN RESERVATION ROADS INCLUDED

IN THE STATE SECONDARY SYSTEM

County	Name	Plain Macadam		Plain Gravel		Unimproved		Total	
		Mi.	Traf.	Mi.	Traf.	Mi.	Traf.	Mi.	Traf.
Blaine	Harlem-Zortman			15.1	117	5.0	109	20.1	115
Roosevelt	Poplar-Scobey					3.8	25	3.8	25
Rosebud	Forsyth-Lame Deer	1.2	88					1.2	88
Totals		1.2	88	15.1	117	8.8	73	25.1	100

2.0418--National Parks Highways

Those constructed parkways leading through the National parks but not included in the Federal Aid System are included in the State Secondary System. Fourteen and eight-tenths miles of the West Gallatin Highway in Gallatin County were built by the Public Roads Administration, the surface type being classified as high type bituminous serving an average of 126 vehicles per day per mile.

2.0419--County Roads

When we speak of county roads on the State Secondary System, we mean those roads now administered by county officials. Another point to be remembered in discussing this section of the system is that of relative improvement. In comparison with improved National Recovery Secondary roads for example, the average county roads now serving State Secondary traffic are inadequately improved, since they lack uniformity in alignment, gradient, and surfacing width.

County roads were originally constructed at the discretion of local county authorities. Traffic dictated the necessity for a road and sections were improved to standards commensurate with its needs. Those roads now serving State Secondary traffic are in general of a higher standard than the county land service roads and significantly larger traffic volumes are sustained.

These roads have been financed through the years dating from their inception in a number of ways. Popular subscription was resorted to in a few cases. Some counties floated bond issues, but in the main the improvement and maintenance of these roads is dependent on motor vehicle license revenues and a five mill property tax levy, plus a two mill levy for bridges, which, under certain conditions may be increased to four mills.

County roads comprising sections of the State Secondary System as comprehended for this report aggregate 2,447.6 miles, 1.2 miles of which is bituminous treated, 640.6 miles of which is gravel surfaced, 176.3 miles of which is graded and drained, and the balance of which is unimproved or primitive road.

2.0419a--State Construction

Two and one-half miles of roadway in Chouteau County serving the residents of Fort Benton as a connection with the primary system has been included with the State Secondary System. This interval was originally constructed by the county officials and later oiled by the State forces and serves traffic in the amount of 160 vehicles per day per mile.

Table 15

COUNTY ROADS INCLUDED ON THE STATE SECONDARY SYSTEM

County	Name	Surface Types: Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	Marion-Jennings			20.5	5					4.1	2			24.6	5
	Swan Lake-Seeley Lake									3.0	122			3.0	122
	Big Fork North			0.5	262									0.5	262
Lake	East Side Flathead L.			10.0	162					9.1	105			19.1	135
	Swan Lake-Seeley L.					2.2	101			4.2	64			6.4	77
Lincoln	Bull Lake Road			7.0	26					7.0	20			14.0	23
District #1				38.0	97	2.2	101			27.4	65			67.6	59
Blaine	Malta-Power Plant Ferry									7.2	13			7.2	13
	Harlem-Zortman									3.5	76	18.1	1	21.6	13
Glacier	Cut Bank North							5.0	78					5.0	78
Hill	Wild Horse Trail					5.0	42	0.9	72	14.0	42	6.3	5	26.2	34
Liberty	Chester South									22.3	13			22.3	13
Toole	Sweet Grass West									0.9	42			0.9	42
District #2						5.0	42	5.9	77	47.9	26	24.4	2	83.2	24
Daniels	Scobey-Opheim					5.3	145			29.0	77			34.3	88
	Scobey-Poplar							5.3	17	10.5	6			15.8	10
Phillips	Malta North							1.0	41	43.8	31			44.8	40
	Malta-Jordan							24.7	28	27.6	14	6.8	2	59.1	19
	Malta-Power Plant Ferry									31.2	27			31.2	27
Roosevelt	Poplar-Scobey					8.0	9	24.0	20	6.9	14			38.9	17
Sheridan	Plentywood North					7.5	41							7.5	41
Valley	Glasgow-Opheim							6.2	136	34.5	48			40.7	62
	Opheim-Scobey							7.4	70	10.4	40			17.8	52
	Nashua-Fort Peck					3.9	362							3.9	362
District #3						24.7	104	68.6	32	193.9	36	6.8	2	294.0	40
Dawson	Circle-Sidney					2.0	89			21.1	28	0.5	12	23.6	33
McCone	Brockway-Terry					5.2	9			5.7	9			10.9	9
	Circle-Sidney									15.6	10			15.6	10
Prairie	Terry-Brockway					0.6	66			25.1	24			25.7	25
	Fallon-Lemay					14.6	30	11.2	15	2.4	20			28.2	23
Richland	Fairview West					10.1	22	9.8	23	36.5	14			56.4	17
	Circle-Sidney					10.2	56	5.7	50	29.3	41			45.2	46
Wibaux	Wibaux-Baker									15.6	47			15.6	47
District #4						42.7	35	26.7	25	151.3	26	0.5	12	221.2	28
Fergus	Hilger-Power Plant Ferry					16.3	106			42.8	38			59.1	57
	Moore-Harlowton			3.0	170	18.9	119							21.9	126
	Big Sandy-Winifred									24.9	17	0.6	3	25.5	17
	Lewistown-Lavina			0.8	316	12.6	98			17.7	37			31.1	69
	Denton-Brooks			4.0	116	13.7	104			0.8	181			18.5	110
Garfield	Jordan-Malta					8.2	4			47.4	15			55.6	19
	Edwards South									21.8	3			21.8	3
Petroleum	Winnett South					6.7	71			4.8	41			11.5	58
District #5				7.8	157	76.4	97			160.2	24	0.6	3	245.0	51
Cascade	Highwood Road			3.9	50	10.9	103							14.8	89
	Great Falls South					9.5	43			36.3	19			45.8	24
Chouteau	Carter-Brady									40.1	21			40.1	21
	Chester-Fort Benton									29.3	24			29.3	24
	Fort Benton-Stanford									40.0	46	4.1	1	44.1	42
	Big Sandy-Winifred									45.1	21			45.1	21
Judith Basin	Moore-Harlowton					2.4	40							2.4	40
	Stanford-Fort Benton					5.3	35							5.3	35
Pondera	Valier East & West					1.9	35	3.0	80	7.8	53			12.7	57
	Brady-Carter					2.5	117			18.3	38			20.8	47
Teton	Chouteau-Dutton					10.1	86							10.1	86
District #6				3.9	50	42.6	71	3.0	80	216.9	28	4.1	1	270.5	35
Broadwater	Helena-White Sulphur Springs									7.0	3			7.0	3
Jefferson	Boulder-Cardwell			10.3	43					24.6	24			34.9	30
Lewis & Clark	Lincoln-Feeder			2.6	108			6.3	103	44.1	64			53.0	71
	Helena-White Sulphur Springs					11.0	55	2.9	145	9.3	83			23.2	77
District #7				12.9	56	11.0	55	9.2	116	85.0	49			118.1	56

Table 15 (Continued)

County	Name	Surface Types												Total	
		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive			
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Granite	Drummond-Ovando			6.2	61									6.2	61
	Philipsburg-Skalkaho			5.3	102									5.3	102
Mineral															
Missoula	Clearwater North									15.0	43			15.0	43
	Lolo West			6.5	32					11.4	24			17.9	27
Powell	Drummond-Ovando			9.3	33	8.1	49			9.8	48			27.2	43
	Avon-Helmville									15.7	19			15.7	19
Ravalli															
Sanders															
District #8				27.3	52	8.1	49			51.9	33			87.3	41
Beaverhead	Gibbons Pass-Dillon					38.0	77			35.5	66			73.5	67
	Divide-Wiedom					17.7	44			10.6	49			28.3	46
	Armstead-Brenner					4.1	80			17.7	65			21.8	68
	Monida-West Yellowstone					6.4	23			38.4	24			44.8	24
	Red Rock Lake North									12.3	4	2.2	6	14.5	4
	Dillon-Twin Bridges					5.1	71			6.0	54			11.1	62
DeerLodge	Anaconda-Ralston			21.6	62					14.1	46			35.7	56
	Divide-Wiedom									3.8	38			3.8	38
Madison	Twin Bridges-Dillon					3.3	108			10.6	43			13.9	59
	Ruby-South									23.0	38			23.0	38
Silver Bow															
District #9				21.6	62	74.6	66			172.0	43	2.2	6	270.4	51
Gallatin	Bridger Canyon Road					6.1	132	2.0	34	12.9	69			21.0	84
Meagher	Millegan South									33.8	5			33.8	5
	White Sulphur Springs-Belena									6.3	25			6.3	25
Park	Bridger Canyon							7.4	33					7.4	33
Sweet Grass	Big Timber North					14.7	74	0.3	120	6.4	86			23.4	79
Wheatland	Harlowton-Moore			2.6	109	17.2	114			1.0	97			20.8	112
	Harlowton-South							5.5	52					5.5	52
District #10				2.6	109	38.0	101	15.2	42	62.4	33			118.2	59
Big Horn	Hardin-Custer			1.3	188	21.3	78							22.6	84
	Hardin-Sarpy			8.9	25	1.2	37			22.3	22			32.4	24
Carbon	Red Lodge-Roscoe					12.7	51	5.2	34	10.1	38			28.0	43
	Red Lodge-Bridger	1.2	279			18.8	146	0.8	236	3.6	197			22.4	165
Golden Valley	Ryegate South					4.9	39	1.5	34	6.8	25			13.2	31
	Lavina-Lewistown					0.7	80	7.5	11	29.0	4	9.7	5	46.9	7
	Lavina South									0.2	80			0.2	80
Musselshell															
Stillwater	Columbus North			3.9	38	0.6	87			35.3	20			39.8	23
	Nye Road			16.4	72	4.3	41	0.3	52					21.0	65
Treasure	Bysham-Ingomar					1.0	47			18.5	11			19.5	13
Yellowstone	Billings-Broadview									38.7	29			38.7	29
	Custer-Hardin					7.4	38			0.2	43			7.6	38
District #11		1.2	279	30.5	59	70.9	85	15.3	34	164.7	23	9.7	5	292.3	43
Carter	Ekalaka West					1.7	43	2.3	23	23.7	12			27.7	15
	Ekalaka East					0.5	21			28.4	17	4.0	6	32.9	16
	Ekalaka South									0.2	58			0.2	58
Custer	Ismay North					2.0	55			7.2	23			9.2	30
	Moon Creek Road					4.3	20							4.3	20
	Mizpah-Powderville					8.7	31			47.4	9	5.1	10	61.2	12
	Ekalaka West									22.3	6			22.3	6
Fallon	Baker North					15.8	129			6.1	31			21.9	102
	Ismay-Plevna									14.7	10			14.7	10
Powder River	Powderville-Broadus					4.7	58	2.2	34	29.0	9			35.9	17
	Broadus Southwest									42.5	24			42.5	24
Rosebud	Ingomar North & South							27.9	8					27.9	8
	Colstrip Road					20.8	46			9.2	25			30.0	40
	Forsyth-Lame Deer			2.7	80	38.6	38			7.8	56			49.1	43
District #12				2.7	80	97.1	55	32.4	11	238.5	16	9.1	8	379.8	26
Statewide		1.2	279	147.3	74	493.3	73	176.3	35	1572.1	30	57.4	4	2447.6	42

2.042--Extent of the State Secondary System

Here as was the case in the discussion of the Federal Aid System, we are interested in the extent of the State Secondary System, its availability with respect to population, land area, and motor vehicle registration. Table No. 16 presents the data by counties and financial districts as follows: (The improved-sections enumerated below comprise the Federal Aid Projects,the N.R.S.Projects, the Works Program Projects, the National Forest Highway Projects (Class 2), State Construction and 1.2 miles built and oil surfaced by Carbon County).

Table 16

EXTENT OF THE STATE SECONDARY SYSTEM IN TERMS OF LAND AREA SERVED,

MOTOR VEHICLES SERVED, AND POPULATION SERVED

County	Length						Improved			Unimproved			Total		
	Improved		Unimproved		Totel		Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mile	Pop. Per Mi.	Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mile	Pop. Per Mi.	Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mile	Pop. Per Mi.
	Mi.	%	Mi.	%	Mi.	%									
Flathead	21.3	0.65	28.1	0.85	49.4	1.50	0.004	310	902	0.004	234	683	0.008	99	389
Lake	16.8	0.51	58.3	1.78	75.1	2.29	0.011	188	567	0.039	55	164	0.050	42	127
Lincoln			53.8	1.64	53.8	1.64				0.015	33	132	0.015	33	132
District #1	38.1	1.16	140.2	4.27	178.3	5.43	0.004	304	942	0.013	225	398	0.017	65	201
Blaine	11.1	0.34	48.9	1.49	60.0	1.83	0.003	220	812	0.011	50	184	0.014	40	151
Glacier	9.7	0.30	5.0	0.15	14.7	0.45	0.003	250	545	0.002	485	1058	0.005	165	360
Hill	14.7	0.45	26.2	0.80	40.9	1.25	0.005	258	937	0.009	144	526	0.014	92	337
Liberty	14.7	0.45	22.3	0.68	37.0	1.13	0.010	52	149	0.016	34	99	0.026	20	59
Toole	3.7	0.11	0.9	0.03	4.6	0.14	0.002	716	1815		2944	7459	0.002	434	1460
District #2	53.9	1.65	103.3	3.15	157.2	4.80	0.004	224	687	0.007	117	357	0.011	76	235
Daniels			50.1	1.53	50.1	1.53				0.034	31	111	0.034	31	111
Phillips	10.4	0.32	144.3	4.39	154.7	4.71	0.002	244	790	0.027	18	56	0.029	17	53
Roosevelt			42.7	1.30	42.7	1.30				0.016	71	252	0.016	71	252
Sheridan	8.7	0.27	7.5	0.22	16.2	0.49	0.005	289	1135	0.005	333	1315	0.010	155	609
Valley	23.6	0.72	62.4	1.90	86.0	2.62	0.005	317	474	0.013	120	179	0.018	87	130
District #3	42.7	1.31	307.0	9.34	349.7	10.65	0.003	342	1063	0.020	50	148	0.023	45	130
Dawson			23.6	0.72	23.6	0.72				0.010	107	419	0.010	107	419
McCone			26.5	0.81	26.5	0.81				0.010	55	181	0.010	35	181
Prairie	11.4	0.35	53.9	1.64	65.3	1.99	0.006	83	345	0.031	17	73	0.037	14	60
Richland	10.9	0.33	101.6	3.09	112.5	3.42	0.005	103	883	0.048	30	95	0.053	28	86
Wibaux	10.3	0.31	15.6	0.47	25.9	0.78	0.012	67	268	0.018	44	177	0.030	26	107
District #4	32.6	0.99	221.2	6.73	253.8	7.72	0.003	268	952	0.023	40	140	0.026	34	122
Fergus	10.3	0.31	156.1	4.75	166.4	5.06	0.002	466	1606	0.036	31	105	0.038	29	99
Garfield			77.4	2.36	77.4	2.36				0.016	13	54	0.016	13	54
Petroleum	10.7	0.33	11.5	0.35	22.2	0.68	0.006	50	192	0.007	5	18	0.013	24	92
District #5	21.0	0.64	245.0	7.46	266.0	8.10	0.002	301	1088	0.023	26	142	0.025	24	86
Cascade	22.1	0.67	60.6	1.85	82.7	2.52	0.008	548	1862	0.022	200	679	0.030	147	498
Chouteau	19.3	0.59	158.6	4.83	177.9	5.42	0.005	152	206	0.040	19	54	0.045	16	49
Judith Basin	10.1	0.31	7.7	0.23	17.8	0.54	0.006	143	518	0.004	188	68	0.010	81	294
Pondere	14.6	0.44	33.5	1.02	48.1	1.46	0.009	170	478	0.021	74	208	0.030	52	145
Teton	14.5	0.44	10.1	0.31	24.6	0.75	0.006	181	419	0.005	260	602	0.011	107	247
District #6	80.6	2.45	270.5	8.24	351.1	10.69	0.006	268	844	0.022	42	126	0.028	62	194
Broadwater			14.7	0.45	14.7	0.45				0.012	60	186	0.012	60	186
Jefferson			34.9	1.06	34.9	1.06				0.021	37	119	0.021	37	118
Lewis & Clark	0.1	0.01	76.2	2.32	76.3	2.33		70959	182357	0.021	92	239	0.021	93	239
Distr[illegible] 47	0.1	0.01	125.8	3.83	125.9	3.84		91907	250541	0.020	73	200	0.020	73	199

Table 16 (Continued)

County	Length						Improved			Unimproved			Total		
	Improved		Unimproved		Total		Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mi.	Pop. Per Mi.	Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mi.	Pop. Per Mi.	Mi. Per Sq. Mi. of Land Area	Reg. Motor Veh. Per Mi.	Pop. Per Mi.
	Mile	%	Mile	%	Mile	%									
Granite	2.4	0.07	11.5	0.35	13.9	0.42	0.001	464	1257	0.007	97	262	0.008	80	217
Mineral			8.5	0.26	8.5	0.26				0.007	76	191	0.007	76	191
Missoula	7.8	0.23	85.9	2.63	93.7	2.86	0.003	1034	2795	0.034	96	253	0.037	86	232
Powell	14.3	0.44	42.9	1.30	57.2	1.74	0.006	144	434	0.019	49	144	0.025	36	108
Ravalli	0.3	0.01			0.3	0.01		11012	30940					11012	30940
Sandere	0.4	0.01	33.1	1.01	33.5	1.02		6432	23780	0.012	48	172	0.012	48	170
District #8	25.2	0.76	181.9	5.55	207.1	6.31	0.002	721	1927	0.016	94	268	0.018	83	235
Beaverhead	7.0	0.21	218.4	6.66	225.4	6.87	0.001	344	952	0.039	11	31	0.040	11	30
DeerLodge	14.4	0.44	39.5	1.20	53.9	1.64	0.019	240	1134	0.053	87	412	0.072	64	302
Madison			60.6	1.85	60.6	1.85				0.017	33	104	0.017	33	104
Silver Bow	8.9	0.27			8.9	0.27	0.012	1377	6390				0.012	1377	6390
District #9	30.3	0.92	318.5	9.71	348.8	10.63	0.003	663	2846	0.029	63	272	0.032	58	247
Gallatin	86.1	2.62	29.8	0.91	115.9	3.53	0.035	70	187	0.012	202	541	0.047	52	139
Park			7.4	0.23	7.4	0.23				0.003	507	1476	0.003	507	1476
Sweet Grass	8.6	0.26	23.4	0.71	32.0	0.97	0.005	143	458	0.011	53	169	0.016	39	123
Meagher	18.8	0.57	42.2	1.29	61.0	1.86	0.008	39	121	0.018	17	54	0.026	12	37
Wheatland	10.6	0.32	26.3	0.80	36.9	1.12	0.007	81	352	0.026	32	142	0.033	23	101
Dietriot #10	124.1	3.77	129.1	3.94	253.2	7.71	0.012	101	299	0.012	97	287	0.024	50	146
Big Horn	6.3	0.19	55.0	1.68	61.3	1.87	0.001	390	1355	0.010	45	155	0.011	40	139
Carbon	6.2	0.19	49.2	1.50	55.4	1.69	0.011	149	568	0.025	66	255	0.036	59	227
Golden Valley	11.3	0.34	60.3	1.84	71.6	2.18	0.009	44	188	0.050	8	36	0.059	7	30
Musselshell	4.3	0.13			4.3	0.13	0.002	414	1684				0.002	414	1684
Stillwater	23.0	0.70	60.8	1.85	83.8	2.55	0.013	80	272	0.035	30	103	0.048	21	75
Treasure	3.1	0.09	19.5	0.60	22.6	0.69	0.003	149	536	0.020	24	85	0.023	21	73
Yellowstone	14.2	0.44	46.3	1.39	60.5	1.83	0.005	813	2166	0.018	249	665	0.023	191	509
District #11	68.4	2.08	291.1	8.86	359.5	10.94	0.004	319	1014	0.019	75	248	0.023	61	192
Carter	7.1	0.22	69.8	2.12	76.9	2.34	0.002	149	582	0.020	15	60	0.022	14	54
Custer	10.0	0.30	97.0	2.96	107.0	3.26	0.003	320	1125	0.026	33	116	0.029	30	105
Fallon	4.2	0.13	36.6	1.12	40.8	1.25	0.003	277	1088	0.023	32	124	0.026	28	112
Powder River	4.2	0.13	78.4	2.39	82.6	2.52	0.002	198	980	0.023	11	50	0.025	10	47
Rosebud	16.7	0.51	108.2	3.30	124.9	3.81	0.003	107	442	0.019	17	68	0.022	15	60
District #12	42.2	1.29	390.0	11.89	432.2	13.18	0.002	193	740	0.023	20	80	0.025	19	73
Grand Total	559.2	17.03	2723.6	82.97	3282.8	100.00	0.004	298	962	0.019	61	197	0.023	51	164

From the standpoint of land area served by the improved sections of the system we find for the state at large that there are 0.004 miles for each square mile of land area. There are 30 counties in which there is less than 0.004 miles per square mile of land area, 25 counties in which there are more than 0.004 miles per square mile of land area. Of the total there are 14 counties in which there is no improved mileage or an insignificant length of such mileage, these being Lincoln, Daniels, Roosevelt, Dawson, McCone, Garfield, Broadwater, Jefferson, Lewis & Clark (0.1 miles), Mineral, Ravalli (0.3 miles), Sanders (0.4), Madison and Park.

There are 31 counties in which the improved mileage per square mile of land area falls in the low range classification, 0.000 to 0.004; 17 counties which fall in the intermediate range, 0.005 to 0.009 miles per square mile of land area; and 8 counties which fall in the high range, 0.010 and over, these being Lake, Liberty, Wibaux, Deer Lodge, Silver Bow, Gallatin, Carbon, and Stillwater counties.

With reference to the unimproved sections we find the average mileage per square mile of land area to be 0.019, there being 23 counties in the low range, 0.000 to 0.10;22 counties in the intermediate range,0.015 to 0.029;and 11 counties in the high range, 0.030 and over, these being Lake, Daniels, Beaverhead, Prairie, Richland, Fergus, Chouteau, Missoula,Deer Lodge, Golden Valley and Stillwater counties. As of the present writing, the tabulation shows no mileage remaining to be improved in Ravalli, Silver Bow, and Musselshell counties.

When considered in the aggregate, we find the average mileage per square mile of land area served to be 0.023. Of the total, 26 counties fall in the low range, 0.000 to 0.020; 23 counties fall in the intermediate range, 0.021 to 0.041; and 7 counties fall in the range, 0.042 and over, these being Lake, Richland, Chouteau, Deer Lodge, Gallatin, Golden Valley, and Stillwater counties.

With reference to vehicles served per mile of improved State Secondary System, we find a range in value from 39 in Meagher County to 1,377 in Silver Bow County the average for the state at large being 298 vehicles per mile of improved County Trunk road. Thirty-six counties fall in the low range, 0 to 199; 12 counties fall in the intermediate range, 200 to 399 and 8 counties fall in the high range,400 and over, these being Toole, Fergus, Cascade, Granite, Missoula, Silver Bow, Musselshell and Yellowstone.

When considered in the light of vehicles served per mile by the system in its entirety, we find the average to be 51, with a range in value from 7 in Golden Valley County to 1,377 in Silver Bow County; there are 31 counties in the low range of values, 0.0 to 49; 15 counties in the intermediate range, 50 to 99;and 10 counties in the range 100 and over, these being Glacier, Toole, Sheridan, Dawson, Cascade, Teton, Silver Bow, Park, Musselshell and Yellowstone.

2.043 **Inventory of the Rural State Secondary System**

The inventory of the State Secondary System portrays a preponderance of unimproved roads, i.e.,roads not improved to standards acceptable to State and Federal administrative agencies. Of the total mileage, (3,282.8 miles), 559.2* miles are considered to be improved on the basis of present standards in effect as of the date of construction. Table 17 presents data concerning the several road sections comprising the State Secondary System.

* Roads built to standards acceptable to State and Federal agencies at the time of the expenditure of program funds. As a consequence the road could have been built to a standard 16' surfaced width, hence below modern standards but acceptable under the provisions of contemporary programs.

Table 17

ADMINISTRATIVE SECTIONS COMPRISING THE STATE SECONDARY SYSTEM

WITH AVERAGE TRAFFIC VOLUMES

Component Roads	Conorete		High Type Bit.		Low Type Bit.		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Fed. Aid Projects	2.0	259			2.3	197	16.0	119	15.0	75							35.3	113
Nat'l. Rscovery	1.1	1460	6.2	445	79.3	369	219.6	88	22.2	71							328.4	165
Secondary																		
Works Prog. (WPSO)					6.4	181	100.7	69	11.3	47							118.4	73
Works Prog. (WPSS)							3.3	345									3.3	345
Works Prog. (WPMS)					2.4	321											2.4	321
Works Prog. (WPGS)	0.2	377			0.8	143											1.0	190
Forest Highways			43.4	184	5.6	141	6.1	16	15.5	43			177.6	17			248.2	60
(Class 2)																		
Forest Highways													2.6	56			2.6	56
(Class 3)																		
Nat'l. Indian							1.2	88	15.1	117			8.8	73			25.1	100
Res. (Primary)																		
Nat'l. Military					2.9	1420											2.9	1420
Rss. Roads																		
Nat'l. Forest							4.2	43					46.1	14			50.3	17
Dev. Roads																		
Nat'l. Parks			14.8	126													14.8	126
Highways																		
County Roads					1.2	279	147.3	74	493.3	71	176.3	37	1572.1	30	57.4	4	2447.6	42
Stats Const.					2.5	160											2.5	160
Totals	3.3	622	64.4	197	103.4	361	498.4	83	572.4	72	176.3	37	1807.2	29	57.4	4	3282.8	59

Tables 18A and 18B following immediately hereafter present similar information, however, more complete data is given by surface type and correlated traffic volume for each county and financial district in the state.

Table 18A

INVENTORY OF THE STATE SECONDARY SYSTEM AND AVERAGE TRAFFIC VOLUMES

1 - Roads improved to acceptable standards - See Note 2/ Table I

2 - Roads which are not improved to acceptable standards - See Note 3/ Table I

3 - Total all roads

County		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Sub-Total Improved		Unimproved		Primitive		Sub-Total Unimproved		Total All Roads	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	1					0.4	35	18.5	163	2.4	149			21.3	159							21.3	159
Flathead	2							21.0	11					21.0	11	7.1	53			7.1	53	28.1	22
	1					5.6	141	11.2	177					16.8	165							16.8	165
Lake	2							10.0	162	2.2	101			12.2	151	46.1	43			46.1	43	58.3	66
	1																						
Lincoln	2							13.1	21					13.1	21	40.7	6			40.7	6	53.8	10
	1					6.0	134	29.7	168	2.4	149			38.1	162							38.1	162
	2							14.1	48	2.2	101			16.3	51	93.9	28			93.9	28	140.2	36
District #1	3					6.0	134	73.8	96	4.6	126			84.4	101	93.9	28			93.9	28	178.3	62
	1					0.3	276			10.8	107			11.1	112							11.1	112
Blaine	2									15.1	117			15.1	117	15.7	57	18.1	1	33.8	27	48.9	56
	1					9.7	555							9.7	555							9.7	555
Glacier	2											5.0	78	5.0	78							5.0	78
	1	0.2	375					14.5	100					14.7	103							14.7	103
Hill	2									5.0	42	0.9	72	5.9	46	14.0	42	6.3	5	20.3	31	26.2	34
	1							14.7	65					14.7	65							14.7	65
Liberty	2															22.3	13			22.3	13	22.3	13
	1							3.7	28					3.7	28							3.7	28
Toole	2															0.9	42			0.9	42	0.9	42
	1	0.2	375			10.0	547	32.9	78	10.8	107			53.9	172							53.9	172
	2									20.1	98	5.9	77	26.0	93	52.9	35	24.4	2	77.3	25	103.3	42
District #2	3	0.2	375			10.0	547	32.9	78	30.9	102	5.9	77	79.9	146	52.9	35	24.4	2	77.3	25	157.2	86
	1																						
Daniels	2									5.3	145	5.3	17	10.6	81	39.5	58			39.5	58	50.1	63
	1							10.4	81					10.4	81							10.4	81
Phillips	2							4.2	43			25.7	29	29.9	31	107.6	28	6.8	2	114.4	29	144.3	29
	1																						
Roosevelt	2									8.0	9	24.0	20	32.0	17	10.7	18			10.7	18	42.7	17
	1							8.7	129					8.7	129							8.7	129
Sheridan	2									7.5	41			7.5	41							7.5	41
	1					8.3	835	15.3	71					23.6	340							23.6	340
Valley	2									3.9	362	13.6	100	17.5	158	44.9	46			44.9	46	62.4	77
	1					8.3	835	34.4	98					42.7	242							42.7	242
	2							4.2	43	24.7	104	68.6	39	97.5	58	202.7	37	6.8	2	209.5	36	307.0	44
District #3	3					8.3	835	38.6	92	24.7	104	68.6	39	140.2	114	202.7	37	6.8	2	209.5	36	349.7	68
	1																						
Dawson	2									2.0	90			2.0	90	21.1	27	0.5	12	21.6	27	23.6	32
	1																						
McCone	2									5.2	9			5.2	9	21.3	10			21.3	10	26.5	10
	1							11.4	89					11.4	89							11.4	89
Prairie	2									15.2	31	11.2	15	26.4	24	27.5	22			27.5	22	53.9	23
	1							10.9	90					10.9	90							10.9	90
Richland	2									20.3	39	15.5	33	35.8	36	65.8	26			65.8	26	101.6	30
	1							10.3	132					10.3	132							10.3	132
Wibaux	2															15.6	47			15.6	47	15.6	47
	1							32.6	103					32.6	103							32.6	103
	2									42.7	35	26.7	26	69.4	32	151.3	25	0.5	12	151.8	25	221.2	27
District #4	3							32.6	103	42.7	35	26.7	26	102.0	55	151.3	25	0.5	12	151.8	25	253.8	37
	1							10.3	117					10.3	117							10.3	117
Fergus	2							7.8	156	61.5	110			69.3	117	86.2	32	0.6	3	86.8	32	156.1	70
	1																						
Garfield	2									8.2	41			8.2	41	69.2	11			69.2	11	77.4	15
	1							10.7	62					10.7	62							10.7	62
Petroleum	2									6.7	70			6.7	70	4.8	41			4.8	41	11.5	58
	1							21.0	89					21.0	89							21.0	89
	2							7.8	156	76.4	98			84.2	103	160.2	24	0.6	3	160.8	24	245.0	51
District #5	3							28.8	109	76.4	98			105.2	101	160.2	24	0.6	3	160.8	24	266.0	55
	1					0.8	51	16.3	86	5.0	53			22.1	77							22.1	77
Cascade	2							3.9	50	20.4	75			24.3	71	36.3	19			36.3	19	60.6	40
	1					4.0	160	11.0	64	4.3	43			19.3	80							19.3	80
Choteau	2															154.5	29	4.1	1	158.6	29	158.6	29

Table 18A (Continued)

County		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Sub-Total Improved		Unimproved		Primitive		Sub-Total Unimproved		Total All Roads	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	1							10.1	63					10.1	63							10.1	63
Judith Basin	2									7.7	36			7.7	36							7.7	36
	1							14.6	93					14.6	93							14.6	93
Pondera	2									4.4	81	3.0	81	7.4	81	26.1	42			26.1	42	33.5	50
	1							14.5	57					14.5	57							14.5	57
Teton	2									10.1	86			10.1	86							10.1	86
	1					4.8	141	66.5	74	9.3	48			80.6	75							80.6	75
	2							3.9	50	42.6	71	3.0	81	49.5	70	216.9	29	4.1	1	221.0	29	270.5	37
District #6	3					4.8	141	70.4	73	51.9	69	3.0	81	130.1	73	216.9	29	4.1	1	221.0	29	351.1	45
	1																						
Broadwater	2															14.7	2			14.7	2	14.7	2
	1																						
Jefferson	2							10.3	43					10.3	43	24.6	24			24.6	24	34.9	30
	1					0.1	80							0.1	80							0.1	80
Lewis & Clark	2							2.6	108	11.0	55	9.2	116	22.8	86	53.4	68			53.4	68	76.2	73
	1					0.1	80							0.1	80							0.1	80
	2							12.9	56	11.0	55	9.2	116	33.1	72	92.7	46					125.8	53
District #7	3					0.1	80	12.9	56	11.0	55	9.2	116	33.2	72	92.7	46			92.7	46	125.9	53
	1							2.4	111					2.4	111							2.4	111
Granite	2							11.5	82					11.5	82							11.5	82
	1																						
Mineral	2									8.5	44			8.5	44							8.5	44
	1					7.8	343							7.8	343							7.8	343
Missoula	2							6.5	33					6.5	33	79.4	20			79.4	20	85.9	21
	1							14.3	56					14.3	56							14.3	56
Powell	2							9.3	33	8.1	49			17.4	40	25.5	30			25.5	30	42.9	34
	1									0.3	67			0.3	67							0.3	67
Ravalli	2																						
	1									0.4	108			0.4	108							0.4	108
Sanders	2									5.0	16			5.0	16	28.1	21			28.1	21	33.1	20
	1					7.8	343	16.7	64	0.7	91			25.2	151							25.2	151
	2							27.3	53	21.6	39			48.9	47	133.0	22			133.0	22	181.9	29
District #8	3					7.8	343	44.0	57	22.3	41			74.1	83	133.0	22			133.0	22	207.1	44
	1							7.0	77					7.0	77							7.0	77
Beaverhead	2									73.3	63			73.3	63	142.9	40	2.2	6	145.1	39	218.4	47
	1			6.2	445	4.8	231	3.4	39					14.4	278							14.4	278
Deer Lodge	2							21.6	62					21.6	62	17.9	44			17.9	44	39.5	54
	1																						
Madison	2									3.3	118			3.3	118	57.3	27			57.3	27	60.6	31
	1	1.1	1329			7.8	111							8.9	261							8.9	261
Silver Bow	2																						
	1	1.1	1329	6.2	445	12.6	157	10.4	65					30.3	227							30.3	227
	2							21.6	62	76.6	65			98.2	64	218.1	36	2.2	6	220.3	36	318.5	45
District #9	3	1.1	1329	6.2	445	12.6	157	32.0	63	76.6	65			128.5	102	218.1	36	2.2	6	220.3	36	348.8	61
	1			58.2	169	23.3	466	4.6	112					86.1	246							86.1	246
Gallatin	2									6.1	131	2.0	34	8.1	107	21.7	61			21.7	61	29.8	74
	1							6.4	85	12.4	67			18.8	73							18.8	73
Meagher	2															42.2	9			42.2	9	42.2	9
	1																						
Park	2											7.4	33	7.4	33							7.4	33
	1					0.6	235	8.0	172					8.6	176							8.6	176
Sweet Grass	2									14.7	74	0.3	120	15.0	75	8.4	86			8.4	86	23.4	79
	1					0.5	96	10.1	87					10.6	87							10.6	87
Wheatland	2							2.6	109	17.2	114	5.5	52	25.3	100	1.0	97			1.0	97	26.3	100
	1			58.2	169	24.4	453	29.1	114	12.4	67			124.1	201							124.1	201
	2							2.6	109	38.0	100	15.2	42	55.8	85	73.3	34			73.3	34	129.1	56
District #10	3			58.2	169	24.4	453	31.7	114	50.4	92	15.2	42	179.9	165	73.3	34			73.3	34	253.2	128
	1							6.3	250					6.3	250							6.3	250
Big Horn	2							10.2	46	22.5	76			32.7	67	22.3	22			22.3	22	55.0	49
	1					1.2	279	4.7	222	0.3	200			6.2	232							6.2	232
Carbon	2									29.5	105	6.0	61	35.5	98	13.7	80			13.7	80	49.2	93

Table 18A (Continued)

County		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Sub-Total Improved		Unimproved		Primitive		Sub-Total Unimproved		Total All Roads	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	1							11.3	67					11.3	67							11.3	67
Golden Valley	2									5.6	43	9.0	15	14.6	26	36.0	8	9.7	4	45.7	7	60.3	12
	1									4.3	15			4.3	15							4.3	15
Musselshell	2																						
	1					19.2	267	2.3	42	1.5	23			23.0	176							23.0	176
Stillwater	2							20.3	65	4.9	46	0.3	53	25.5	61	35.3	17			35.3	17	60.8	36
	1							3.1	65					3.1	65							3.1	65
Treasure	2									1.0	47			1.0	47	18.5	11			18.5	11	19.5	13
	1	2.0	259			9.0	213	3.2	75					14.2	188							14.2	188
Yellowstone	2									7.4	38			7.4	38	38.9	29			38.9	29	46.3	30
	1	2.0	259			29.4	251	30.9	127	6.1	26			68.4	175							68.4	175
	2							30.5	59	70.9	78	15.3	34	116.7	77	164.7	23	9.7	4	174.4	23	291.1	45
District #11	3	2.0	259			29.4	251	61.4	93	77.0	75	15.3	34	185.1	113	164.7	23	9.7	4	174.4	23	359.5	66
	1							7.1	69					7.1	69							7.1	69
Carter	2									2.2	38	2.3	23	4.5	30	61.3	16	4.0	6	65.3	15	69.8	16
	1							10.0	21					10.0	21							10.0	21
Custer	2									15.0	33			15.0	33	76.9	9	5.1	10	82.0	10	97.0	14
	1							4.2	36					4.2	36							4.2	36
Fallon	2									15.8	129			15.8	129	20.8	19			20.8	19	36.6	68
	1									4.2	35			4.2	35							4.2	35
Powder River	2									4.7	58	2.2	34	6.9	50	71.5	18			71.5	18	78.4	21
	1							14.1	54	2.6	35			16.7	51							16.7	51
Rosebud	2							3.9	82	59.4	41	27.9	8	91.2	33	17.0	39			17.0	39	108.2	34
	1							35.4	46	6.8	35			42.2	44							42.2	44
	2							3.9	82	97.1	55	32.4	11	133.4	55	247.5	16	9.1	8	256.6	16	390.0	25
District #12	3							39.3	49	103.9	53	32.4	11	175.6	52	247.5	16	9.1	8	256.6	16	432.2	27
	1	3.3	622	64.4	197	103.4	361	339.6	93	48.5	67			559.2	156							559.2	156
	2							158.8	60	523.9	72	176.3	37	859.0	63	1807.2	29	57.4	4	1864.6	29	2723.6	40
Statewide	3	3.3	622	64.4	197	103.4	361	498.4	83	572.4	72	176.3	37	1418.2	100	1807.2	29	57.4	4	1864.6	29	3282.8	59

Table 18B
TRAFFIC DENSITY CLASSIFICATION OF THE
STATE SECONDARY SYSTEM BY SURFACE TYPES

1 - Roads improved to acceptable standards

2 - Roads which are not improved to acceptable standards

3 - Total all roads

Surface Types		Traffic Volume Groups															Total Mi.	Ave. Tr.
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499		
	1	0.0	0.0	0.0	0.0	0.0	1.7	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	3.3	622
Concrete	2																	
Paving	3	0.0	0.0	0.0	0.0	0.0	1.7	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	3.3	622
High	1	0.0	0.0	0.0	0.0	41.8	17.1	1.2	1.2	1.2	1.2	0.7	0.0	0.0	0.0	0.0	64.4	197
Type	2																	
Bit.	3	0.0	0.0	0.0	0.0	41.8	17.1	1.2	1.2	1.2	1.2	0.7	0.0	0.0	0.0	0.0	64.4	197
Low	1	0.0	0.1	0.3	3.9	20.4	24.9	16.9	13.9	13.9	6.4	0.3	0.4	0.3	0.9	0.8	103.4	361
Type	2																	
Bit.	3	0.0	0.1	0.3	3.9	20.4	24.9	16.9	13.9	13.9	6.4	0.3	0.4	0.3	0.9	0.8	103.4	361
	1	0.0	0.0	2.0	239.1	98.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	339.6	93
Plain	2	0.0	15.1	49.2	75.4	17.6	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	158.8	60
Macadam	3	0.0	15.1	51.2	314.5	116.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	498.4	83
	1	0.8	4.1	8.8	25.5	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.5	67
Plain	2	10.1	32.7	115.2	250.9	111.6	0.9	0.9	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	523.9	72
Gravel	3	10.9	36.8	124.0	276.4	120.9	0.9	0.9	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	572.4	72
Graded	1																	
and	2	16.7	73.0	46.1	24.7	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	176.3	37
Drained	3	16.7	73.0	46.1	24.7	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	176.3	37
	1																	
	2	126.2	818.0	716.3	146.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1807.2	29
Unimproved	3	126.2	818.0	716.3	146.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1807.2	29
	1																	
	2	54.3	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.4	4
Primitive	3	54.3	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.4	4
	1	0.8	4.2	11.1	268.5	170.0	43.7	18.5	15.3	15.2	7.7	1.1	0.5	0.4	1.2	1.0	559.2	156
All	2	207.3	941.9	926.8	497.7	145.0	2.4	0.9	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	2723.6	40
Types	3	208.1	946.1	937.9	766.2	315.0	46.1	19.4	16.0	16.1	7.7	1.1	0.5	0.4	1.2	1.0	3282.8	59

By reference to Table 18B we find that the greatest mileage falls in the group interval 10-24. If, however, we classify traffic in groups of 100, we are still correct in saying that the greatest mileage falls in the group 0-99, the mode, or in this case the average being 50. In subsequent discussion we will then assign the value 50 to the lower limit of representative county trunk traffic and conversely the value would determine the typical high traffic volume on the land service system, for the state as a whole.

Referring to Tables 18A and 18B we find pertinent data as follows:

IMPROVED SECTIONS

Surface Types	Percent of Total Length	Traffic Data					Counties wherein surface type bears more than average traffic borne by each surface type
		Average	Rating 1/	Range	Modal Class	Median	
Concrete	0.1	622	4.0	200-1499	200-299	297	Silver Bow
High Type Bituminous Paving	2.0	197	1.3	100-752	100-199	177	Deer Lodge
Low Type Bituminous Surfacing	3.1	361	2.3	19-1499	200-299	312	Glacier, Valley, Gallatin
Plain Macadam	10.3	93	0.6	25-199	50-99	85	Flathead,Lake, Hill, Sheridan, Wibaux,Fergus Granite, Sweet Grass, Big Horn, Carbon
Plain Gravel	1.5	67	0.4	7-165	50-99	71	Flathead, Blaine, Ravalli, Sanders, Meagher, Carbon
All Improved Types	17.0	156	1.0	7-1499	50-99	98	Flathead, Lake,Glacier,Valley, Missoula, Deer-Lodge, Silver Bow, Gallatin,Sweat Grass, Big Horn, Carbon, Stillwater, Yellowstone

1/ Rated by traffic use, average 40 = 1.0.

UNIMPROVED SECTIONS

Surface Types	Percent of Total Length	Traffic Data					Counties wherein surface bears more traffic than average borne by each surface type.
		Average	Rating 1/	Range	Modal Class	Median	
Plain Macadam	4.9	60	1.5	10-283	50-99	60	Lake, Fergus, Lewis & Clark, Granite, DeerLodge, Wheatland, Stillwater, Rosebud
Plain Gravel	15.9	72	1.8	1-576	50-99	72	Lake, Blaine, Daniels,Valley, Dawson, Fergus,Cascade, Pondera, Teton, Madison, Gallatin, Sweet Grass, Wheatland, Big Horn, Carbon, Fallon
Graded & Drained	5.4	37	0.9	1-123	10-24	24	Glacier, Hill,Pondera, Lewis & Clark, Sweat Grass Wheatland, Carbon, Stillwater
Unimproved	55.0	29	0.7	1-89	10-24	23	Flathead, Lake,Blaine, Hill, Toole,Daniels,Valley Wibaux, Fergus, Petroleum, Pondera,Lewis &Clark, Beaverhead, DeerLodge, Sweet Grass, Gallatin, Wheatland, Carbon, Rosebud
Primitive	1.8	4	0.1	1-15	0-9	5	Hill, Dawson, Beaverhead, Carter, Custer
All Unimproved Sections	83.0	40	1.0	1-576	10-24	31	Lake, Blaine, Glacier, Toole, Sheridan, Daniels, Valley, Wibaux, Fergus, Petroleum, Pondera,Teton Lewis & Clark, Granite, DeerLodge, Mineral, Beaverhead, Gallatin, Sweet Grass, Wheatland, Big, Horn, Carbon, Fallon

1/ Rated by traffic use average 40 = 1.0.

PLATE V B

Usage Of The State Secondary System In Montana In Terms Of Vehicle-Miles

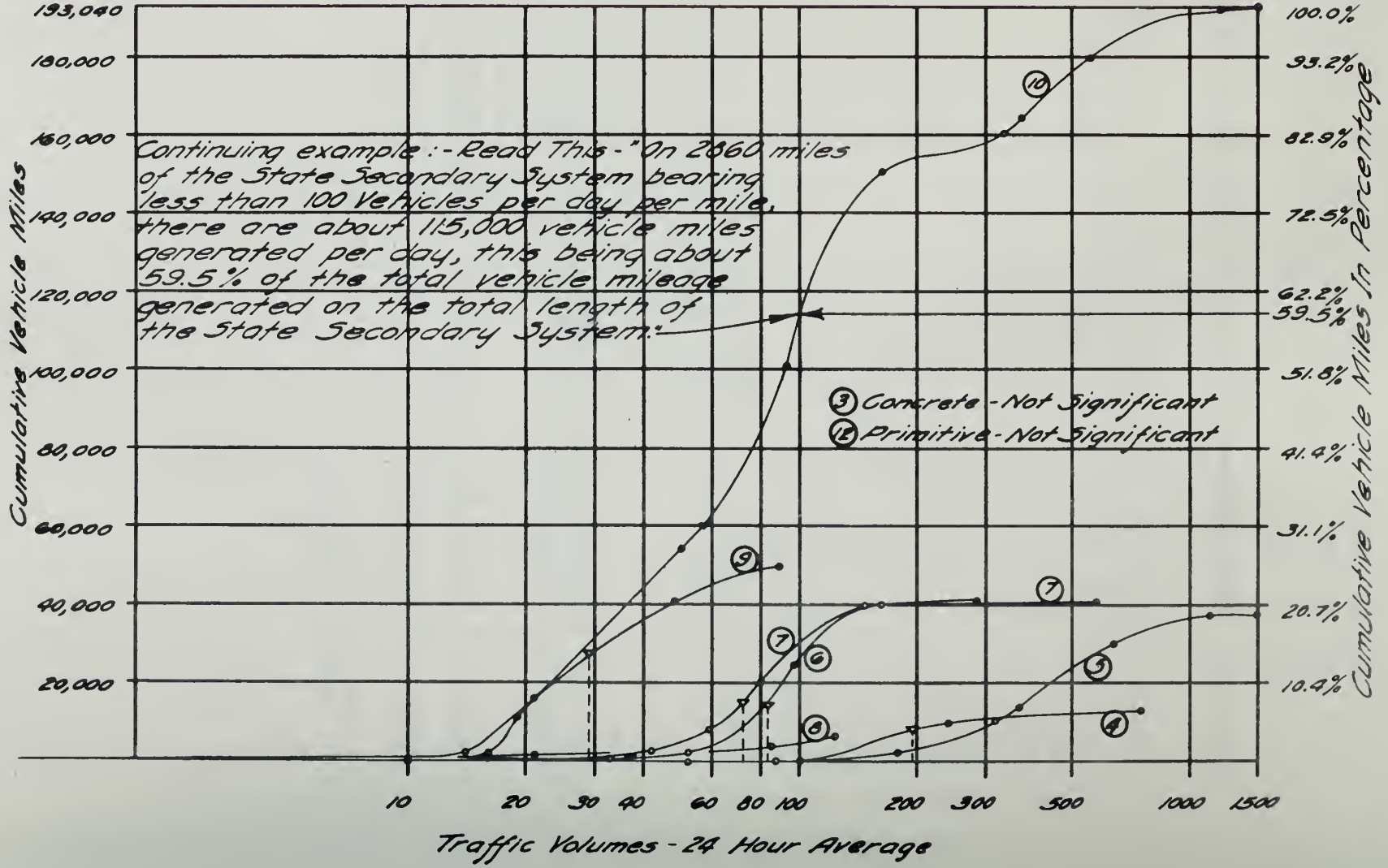
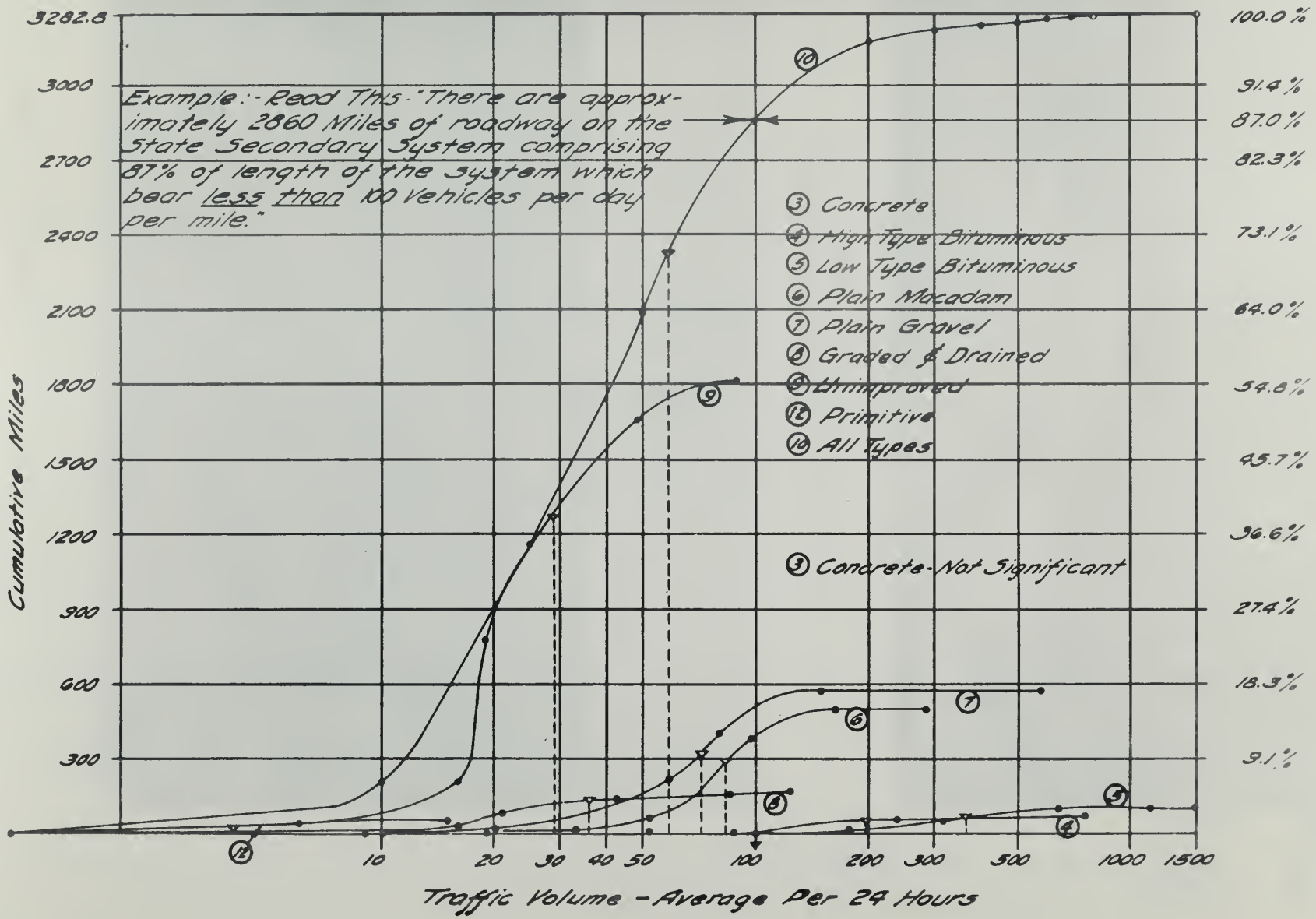


PLATE V A

Usage On The State Secondary System In Montana



A TYPICAL ROAD ON THE LAND SERVICE SYSTEM

A TYPICAL IMPROVED ROAD ON THE STATE SECONDARY SYSTEM

2.044 Classification of the State Secondary System by Width Groups

The classification of the State Secondary System by width groups shows a considerable deficiency on most sections other than those improved by State and Federal Agencies. Tables 19A, 19B and 19C set forth pertinent data respecting width groups by surface types and average traffic volume therefor.

Of the total improved to acceptable high standards (559.2 miles) there are 22.9 miles lacking in width, i.e., less than 16 feet. Of the total mileage existing and awaiting standarized construction (2,723.6 miles), 710.7 miles are deficient in width. At this point in the discussion we may then say that the system exists in a state of completion as follows:

-1- In terms of mileage improved $\frac{559.2}{3282.8} = 17.0\%$

-2- In terms of adequate width $\frac{2549.2}{3282.8} = 44.65\%$

A TYPICAL ROAD ON THE FEDERAL AID SYSTEM

Table 19A

WIDTH CLASSIFICATION OF THE STATE SECONDARY SYSTEM AND AVERAGE TRAFFIC VOLUMES

"Sections Improved to Acceptable Standards"

| Counties | Surface Types | | |

Table 19B

WIDTH CLASSIFICATION OF THE STATE SECONDARY SYSTEM AND AVERAGE TRAFFIC VOLUMES

"Sections Not Improved to Acceptable Standards"

| Counties | Surface Types | | |

Table 19C

TRAFFIC DENSITY CLASSIFICATION OF THE STATE SECONDARY SYSTEM

BY SURFACE TYPE AND WIDTH

"Classification Set Forth Only Where There is a Significant

Change From That Shown in Section 2.043"

"Sections Improved to Acceptable Standards"

Surface Type	Width Groups	Traffic Data				Traffic Volume Groups												Total Length Miles
		Ave.	Range	Modal Class	Median	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 1499	
						Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
Low	16-26	362	19-1499	200-299		0.0	0.1	0.3	3.9	20.4	24.4	15.5	13.9	13.9	6.4	0.3	2.4	101.5
Type	27-35	290	261-299	200-299	290	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Sit.	36-44	276	253-299	200-299	276	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	45 & Over	334	300-368	300-399	334	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	1.4
Plain	Under 16	46	25-193	50-99	69	0.0	0.0	2.0	5.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2
Macadam	16-26	94	50-199	50-99	85	0.0	0.0	0.0	33.6	97.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	331.4
Plain	Under 16	50	7-107	50-99	48	0.8	3.6	3.1	6.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7
Gravel	16-26	77	10-165	50-99	83	0.0	0.5	5.7	19.2	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.8

"Sections Not Improved to Acceptable Standards"

Surface Type	Width Groups	Traffic Data				Traffic Volume Groups									Length Miles
		Ave.	Range	Modal Class	Median	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	
						Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
Plain	Under 16	48	10-283	50-99	48	0.0	15.1	38.0	46.3	4.1	0.8	0.0	0.0	0.0	104.3
Macadam	16-26	79	27-204	50-99	77	0.0	0.0	11.2	29.1	13.5	0.6	0.0	0.0	0.0	54.4
	45 & Over	260	260	200-299	260	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Plain	Under 16	53	1-159	25-49	68	10.1	30.9	80.2	61.0	35.5	0.0	0.0	0.0	0.0	216.7
Gravel	16-26	87	10-576	25-49	89	0.0	1.8	35.0	189.9	76.1	0.6	0.9	0.7	0.9	306.9
	36-44	280	280	200-299	280	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
	45 & Over	295	295	200-299	295	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2
Graded &	16-26	35	1-123	25-49	23	16.7	73.0	46.1	23.8	13.6	0.0	0.0	0.0	0.0	173.2
Drained	27-35	155	1-232	100-299	129	0.0	0.0	0.0	0.9	2.2	0.0	0.0	0.0	0.0	3.1
Unimproved	Under 16	16	1-34	10-24	14	110.5	174.1	47.7	0.0	0.0	0.0	0.0	0.0	0.0	332.3
	16-26	32	1-89	25-49	25	15.7	643.9	660.8	143.0	0.0	0.0	0.0	0.0	0.0	1463.4
	27-35	47	39-55	25-49	43	0.0	0.0	7.2	3.7	0.0	0.0	0.0	0.0	0.0	10.9
	45 & Over	48	48	25-49	48	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6

2.046 Comparisons of Use of the Rural State Secondary System with that of the Land Service System

In order that we may evaluate the State Secondary System with respect to the Land Service System, comparisons are made on the basis of traffic use over the two systems. While the comparison shows several sections of the State Secondary System wanting or deficient, it is to be remembered that the system as proposed, statewide in its extent, is improved in a very small amount. These lesser traveled sections, unimproved in the main, if improved, would draw increased traffic volumes as a consequence of traffic convenience alone with no consideration being given for other factors, economic or recreational, which bear on the genesis of traffic. This item would also temper discussion of State Secondary System's apparent deficiency in traffic volume over the system as a whole, since it is almost axiomatic that traffic increases along a road in direct ratio with the progress of improvement. The average traffic volume for the system as a whole is obviously deficient if we consider it as a measure of revenue in terms of gas tax receipts returning to the state for construction and maintenance. However, if we refer to traffic volumes manifest in the higher brackets, we find them limited in the main to those sections improved by State and Federal Agencies, and generally sufficient within themselves to pay for their construction and maintenance, due allowance being made for pending Federal participation.

We have stated previously that secondary road construction has been prosecuted along those sections of the State Secondary System where traffic volumes manifestly warranted improvement. A convenient method of proving the successful use of such controls is shown in Plate IV wherein we set forth significant lengths of low traffic roads on the State Secondary System as opposed to high traffic roads (potential locations for improvement off the State Secondary) on the Land Service System.

Operating on the basis that 50 cars or more per day determine high value land service roads, we find significant lengths (5.0 miles or more) in each of the several counties and financial districts as follows:

Table 20

LAND SERVICE ROADS OF SIGNIFICANT LENGTH WHICH BEAR

TRAFFIC IN EXCESS OF 50 VEHICLES PER DAY

(5.0 Miles or over)

County	Terminals	Length	Traffic
Flathead	Kila South	5.4	58
	Kalispell Northwest	9.1	54
	Kalispell North	12.1	61
	Old Whitefish Road	10.0	54
	LaSalle Road	12.5	150
	Old U. S. 2 - Kalispell East	6.8	64
	Four Corners - Lower Valley	7.7	117
	Somers - Big Fork	10.8	122
	Suburban & Connecting Roads	25.6	70
		100.0	84
Lake	Polson - Round Butte	7.4	108
	Polson West	6.3	55
	Dayton - Proctor	6.4	66
	Moise Northeast	6.5	47
	Suburban & Connecting Roads	13.5	62
		40.1	66
Lincoln	Libby Southeast	6.0	56
	Suburban & Connecting Roads	1.6	49
		7.6	54
Sub-Total District No. 1		147.7	77
Blaine	Hogeland - Turner	15.4	60
	Chinook North	8.5	61
	Chinook Southeast	8.6	49
	Harlem Northeast	24.7	57
	Harlem North	16.2	57
	Harlem East	18.4	77
	Turner South	5.7	58
	Agency East	7.7	53
	Suburban & Connecting Roads	11.0	56
		116.2	61
Glacier	Oil Field Feeder	13.4	87
	Cut Bank East	6.7	55
	Cut Bank South	9.6	75
	Cut Bank North	13.9	65
	Suburban & Connecting Roads	2.7	125
		46.3	76
Hill	Rudyard North	21.3	97
	Gildford South	6.3	55
	Box Elder North	7.0	55
	Havre - Beaver Creek	22.9	67
	Havre North	19.9	65
	Suburban & Connecting Roads	17.1	73
		96.5	73
Liberty	Joplin North	8.3	60
	Suburban & Connecting Roads	4.5	58
		12.8	59
Toole	Kevin West & South	11.8	89
	Sunburst East	5.5	53
	Kevin - Ferdig	8.0	113
	Ferdig South & West	7.9	102
	Oilmont East	9.3	139
	Kevin - Sunburst	6.8	170
	Oilmont North & South	9.8	81
	Shelby Northeast	9.5	80
	Suburban & Connecting Roads	9.6	70
		78.2	100
Sub-Total District No. 2		350.0	75
Daniels	Scobey Northwest	5.3	45
	Scobey East	5.7	89
	Scobey North	11.7	69
	Flaxville South	11.4	60
	Suburban & Connecting Roads	3.2	57
		37.3	68

Table 20 (Continued)

County	Terminals	Length	Traffic
Phillips	Suburban & Connecting Roads	12.3	106
Roosevelt	Volt - Wolf Point	17.5	68
	Wolf Point North	11.1	54
	Brockton Northwest	11.9	51
	Suburban & Connecting Roads	6.1	71
		46.6	61
Sheridan	Camerton East	6.3	67
	Outlook - Raymond	9.6	56
	Archer North	8.3	78
	Dooley Camerton	6.9	80
	Plentywood Southwest	5.1	59
	Antelope Northeast	5.4	60
	Dooley South	6.2	60
	Reserve East & West	27.2	71
	Coalridge South	5.2	56
	Homestead West	7.0	109
	Suburban & Connecting Roads	11.8	93
		99.0	73
Valley	Glasgow West	12.8	98
	Richland South	11.2	54
	Fort Peck North	9.7	78
	Nashua Southwest	8.1	95
	Nashua Northeast	10.0	65
	Suburban & Connecting Roads	10.9	77
		62.7	78
Sub-Total District No. 3		265.8	72
Dawson	Richey South	26.4	62
	Deer Creek Road	12.3	52
	Suburban & Connecting Roads	2.2	83
		40.9	60
McCone	Circle Northwest	6.3	50
	Vida North & South	11.7	64
	Suburban & Connecting Roads	1.0	72
		19.0	60
Prairie	Hazel Road	5.0	51
	Suburban & Connecting Roads	3.9	67
		8.9	58
Richland	Sidney Northwest	5.7	52
	Savage Northeast	6.2	66
	Sidney South	5.9	58
	Suburban & Connecting Roads	7.8	70
		25.6	62
Wibaux	Carlyle West	5.7	57
	Carlyle North	13.5	52
		19.2	53
Sub-Total District No. 4		113.6	59
Fergus	Coffee Creek - Denton	7.3	69
	Denton North	11.2	67
	Lewistown - Hanover	9.4	155
	Lewistown North	5.0	90
	Brooks East	6.1	66
	Heath South	7.2	67
	Lewistown - Grass Range	5.2	53
	Buffalo East	6.3	61
	Suburban & Connecting Roads	20.1	132
		77.8	94
Garfield		0.0	0
Petroleum	Sinnett - Cat Creek	12.9	56
	Suburban & Connecting Roads	4.1	51
		17.0	55
Sub-Total District No. 5		94.8	87

Table 20 (Continued)

County	Terminals	Length	Traffic
Cascade	Cascade East	6.7	74
	Black Eagle Northeast	10.7	68
	Great Falls West	7.4	78
	Ulm Southeast	14.0	56
	Great Falls South	18.6	99
	Belt Northeast	7.0	87
	Stockett Sand Coulee Road	17.7	170
	Suburban & Connecting Roads	13.4	162
		95.7	107
Chouteau	Highwood Road	5.1	93
	Highwood - Fort Benton	12.1	93
	Loma Northwest	5.6	52
	Highwood East	5.7	57
	Suburban & Connecting Roads	13.2	57
		41.7	71
Judith Basin	Stanford - Denton	8.3	54
	Suburban & Connecting Roads	1.6	81
		9.9	59
Pondera	Conrad - Valier	13.6	73
	Gallup City - Conrad	15.3	85
	Ledger West	5.9	61
	Conrad - Dupuyer	24.6	61
	Conrad - East	8.9	141
	Suburban & Connecting Roads	17.0	81
		85.3	79
Teton	Pendroy East	11.1	50
	Choteau Northeast	7.8	94
	Fairfield North	6.1	73
	Cliev South	9.1	64
	Power West	19.5	88
	Suburban & Connecting Roads	14.0	56
		67.6	71
Sub-Total District No. 6		300.2	84
Broadwater	Canton Road	8.7	80
	Toston - Radersburg	11.1	55
	Suburban & Connecting Roads	6.1	86
		25.9	112
Jefferson	Jefferson City - Wickes	5.0	60
	Whitehall - Silver Star	10.3	85
	Boulder - Whitehall	21.3	66
	Suburban & Connecting Roads	1.2	100
		37.8	71
Lewis & Clerk	Augusta West	8.9	67
	Helena - York	13.8	59
	Helena - Lake Helene	8.4	64
	Helene - Silver City	14.6	128
	Helena - Unionville	5.4	78
	East Helene North	5.8	58
	Suburban & Connecting Roads	11.3	102
		68.2	84
Sub-Totel District No. 7		131.9	86
Granite	Suburban & Connecting Roads	5.5	60
Mineral	Suburban & Connecting Roads	0.6	55
Missoula	Missoula West	16.4	89
	Missoula South	5.0	91
	Missoula North	6.5	99
	Suburban & Connecting Roads	13.6	152
		41.5	111
Powell	Gold Creek South	5.6	56
	Suburban & Connecting Roads	10.1	70
		15.7	65

Table 20 (Continued)

County	Terminals	Length	Traffic
Ravalli	Stevensville Northeast	8.9	69
	Grantsdale South	10.3	136
	Stevensville East	5.2	85
	Stevensville South	21.1	135
	Hamilton South	7.0	96
	Suburban & Connecting Roads	34.9	106
		87.4	125
Sanders	Camas - Lone Pine	6.0	58
	Suburban & Connecting Roads	19.2	115
		25.2	102
Sub-Total District No. 8		175.9	111
Beaverhead	Suburban & Connecting Roads	4.9	68
Deer Lodge	Anaconda West	10.3	65
	Suburban & Connecting Roads	13.5	69
		23.8	67
Madison	Harrison - Pony	5.9	115
	Pony Southeast	6.3	76
	Norris - Bozeman	11.8	66
	Jefferson Island South	6.0	89
	Suburban & Connecting Roads	16.8	63
		46.8	76
Silver Bow	Browns Gulch Road	8.4	88
	Basin Creek Reservoir	5.5	75
	Upper Nine Mile Road	6.5	169
	Suburban & Connecting Roads	17.6	147
		38.0	127
Sub-Total District No. 9		113.5	91
Gallatin	Norris - Three Forks	10.8	56
	Three Forks - Trident	6.3	119
	Manhattan South	10.9	75
	Three Forks - Willow Creek	6.3	66
	Manhattan East	7.0	73
	Belgrade South	9.5	72
	Gallatin Gateway East	5.3	64
	Bozeman North	6.0	140
	Belgrade West	12.1	99
	Bozeman - Norris	19.1	81
	Bozeman West	14.1	99
	Bozeman South	8.7	85
	Suburban & Connecting Roads	8.6	67
		124.7	90
Park	Livingston Southwest	9.6	84
	Livingston - Swingley	19.3	56
	Suburban & Connecting Roads	6.3	73
		35.2	67
Sweet Grass	Big Timber - McLeod	26.4	74
Meagher	Suburban & Connecting Roads	2.3	115
Wheatland	Two Dot South	5.6	53
	Shawmut North	6.9	63
	Suburban & Connecting Roads	2.9	86
		15.4	64
Sub-Total District No. 10		204.0	82
Big Horn	Hardin - Fort Smith	18.7	142
	Lodge Grass East	5.1	64
	Suburban & Connecting Roads	12.1	78
		35.9	109
Carbon	Edgar East & West	14.6	100
	Joliet South	7.1	57
	East Bridger North	7.4	64
	Suburban & Connecting Roads	17.5	72
		46.6	77
Golden Valley		0.0	0
Musselshell	Suburban & Connecting Roads	3.1	76

Table 20 (Continued)

County	Terminals	Length	Traffic
Stillwater	Wheatbeein - Molt	9.6	65
	Fishtail Creek Road	6.3	102
	Suburban & Connecting Roads	13.1	81
		29.0	80
Treasure	Suburban & Connecting Roads	7.2	55
Yellowstone	Worden East	6.1	95
	Polytechnic West	23.1	75
	Polytechnic Drive	10.4	230
	Billings - Hester	10.5	61
	Shepherd Road	5.0	92
	Billings South	11.2	69
	Suburban & Connecting Roads	45.1	09
		111.4	97
Sub-Total District No. 11		233.2	91
Carter	Albion - Alzada	6.5	56
	Suburban & Connecting Roads	2.1	55
		8.6	56
Custer	Miles City Northeast	10.7	62
	Mizpah Northwest	16.1	78
	Suburban & Connecting Roads	3.9	65
		30.7	72
Fallon	Baker - Webster	16.0	65
	Suburban & Connecting Roads	22.8	65
		38.8	65
Powder River		0.0	0
Rosebud	Ashland - Birney	34.5	60
	Suburban & Connecting Roads	1.1	59
		35.6	60
Sub-Total District No. 12		113.7	65
GRAND TOTAL		2,244.3	82

Of the total mileage (2092.1 miles) on the State Secondary System, which bear Less than 50 vehicles per day per mile, there are but 16.1 miles improved to acceptable standards.

2.05--Land Service Road System

For purposes of this report, the Land Service Road System comprises a system of Local roads, subordinate to and tributary to the State Secondary System and the Federal Aid System. As implied in the title, its use is confined chiefly to local residents in rural areas; however, those sections of the National Park System not included with the Federal Aid or State Secondary System are discussed herein as a part of the Land Service System. Administrative agencies involved in the construction and maintenance of the system are the several Board of County Commissioners, the Forest Service, the Office of Indian affairs, the National Park Service, the Montana Highway Department, the Public Roads Administration and the Federal Military Authorities. The system in all comprises an aggregate length of 57,028.5 miles.

Mere mention of these agencies suggests a variance in operative functions for each of the sub-systems placed in their care. Section 2.051 following essays clarification with respect to these differences in administrative characteristics.

2.051 Administrative History of the Sub-systems Comprising the Land Service System

A. County Roads

The present development of the county roads comprising the bulk of the mileage on the Land Service Roads System can be attributed to a commendable desire on the part of local authorities to serve the public. Public demand for roads was evinced through usage;as a consequence, roads and road improvements followed naturally in the wake of settlement. This controlling feature of the county road development program is entirely logical and rational when viewed from the standpoint of public welfare, however, it had its limitation, from an economic standpoint, in that roads were built to outlying districts which served but one or two families. Where public interest ends and private benefits enter in the development of a system, is a moot question and this section of the report will not attempt to present conclusions respecting solutions of the problem.

As a consequence of the program, we now have in our county system 53,136.9 miles of road, 25,000 miles of which bear traffic in an amount less than 5 vehicles per day.

Road improvements in the state originated with the construction of Mullan Trail as a military road in 1863. Subsequent improvements were, as stated heretofore, timed with the settlement of the state as a result of fundamental economic developments as follows:

1. Gold discoveries in the 1860's.
2. The cattle and sheep industry in the 1860's. "A corollary of gold discoveries."
3. Agricultural development dating from the 1880's.

Roads on the County System were improved under the supervision of the County Boards of Commissioners, road districts being set up with a foreman in immediate contact with the work. Improvements were directed toward affording a low standard road for the convenience of the rural residences. The degree of development now existing resulted as a consequence of progressive maintenance rather than initial improvement.

Previous to the development of the motor vehicle, funds for the construction and maintenance of the roads derived from the general property tax. With the advent of the self-propelled motor vehicle, additional funds were provided by motor vehicle license tax fees and gasoline tax receipts now discontinued since the passage of Initiative Measure No. 31 which provided that all gas tax receipts should go to the State Highway fund. In all, it is estimated that approximately $115,000,000.00 have been expended since 1889 on the construction and maintenance of the county road system.

B. Forest Highway Development Roads

Forest Highway Development Roads are those roads administered by the Forest Service. Essentially, they are roads which pertain to the development and protection of the National Forest Reserves. The Federal Highway Act (42 Stat. 212) recognized the need for the development of these roads and apportioned monies for the improvement and up-keep of the system under the control of the U.S.Forest Service. The roads serve to help the Forestry Department in their work of fire prevention and their administrative duties. As a consequence of their location, they are used somewhat by local residents both in their business pursuits and their recreational activities. Since their usage, other than that devoted to administration functions, is confined in the main to local residents they are combined with the County roads, the Indian Reservation roads,etc. to form the Land Service Road System.

C. National Forest Highways (Unimproved).
See above and Section 2.0415 of this report.

D. Indian Reservation Roads

Funds for the construction and maintenance of a system of roads not eligible for Federal Aid were appropriated by Act (45 Stat. 750) approved May 26, 1928. These roads serve to facilitate the administration of Indian Affairs by the Department of Interior and operate to the benefit of Indians resident on the National Indian Reservation. As a consequence of their use by local residents, they are considered, for this section of the report, as a part of the Land Service Road System.

E. National Military Reservation Roads.

Two sections of road, one leading to the Big Hole Battlefield in Beaverhead County, and the other to the Custer Battlefield in Big Horn County have been included herewith as part of the Land Service System.

F. National Parks Highways.

All National Parks Highways not included in the Federal Aid System or the State Secondary System are included herewith as a part of the Land Service System.

G. Federal Aid Projects.

Two sections of highway built under the provisions of the original Federal Aid Act and superseded by revised locations are included herewith as a part of the Land Service System.

2.052--Extent of the Land Service Road System If we evaluate the Land Service System on the basis of use, we find divergent data as a consequence of variant economic functions predominant in a county or district. For example, we find Sweet Grass County apparently lacking roads when we compare it with Hill County, however, if we stop to consider that Sweet Grass is a "grazing" county as opposed to "wheat raising" Hill County, the differential is easily explained. Table 21 presents data as follows relating to the county road mileage per square mile area, mileage per registered motor vehicle and population per mile. These data are further qualified by entries giving general features of topography and land usage.

Table 21

AVAILABILITY OF THE RURAL LAND SERVICE SYSTEM

County	Length in Miles	Percent of Total	Topography	Land Use	Miles Per Sq. Mi. of Land Area	Motor Veh. Per Mile	Pop. Per Mile
Flathead	955.2	1.67	Mountainous	Grain & Truck	0.185	6.89	20.10
Lake	718.0	1.26	Plains	Grain & Fruit	0.477	5.25	13.29
Lincoln	679.8	1.19	Mountainous	Grain & Lumbering	0.188	2.61	10.43
District #1	2353.0	4.12			0.228	5.15	15.23
Blaine	1443.0	2.53	Plains	Grain & Beets	0.342	1.68	6.24
Glacier	878.5	1.54	Plains	Stock & Grain	0.295	2.76	6.03
Hill	2984.8	5.23	Plains	Grain	1.010	1.27	4.62
Liberty	1195.2	2.10	Plains	Grain	0.823	0.64	1.84
Toole	1687.2	2.96	Plains	Grain & Oil	0.862	1.57	3.98
District #2	8188.7	14.36			0.605	1.35	4.52
Daniels	893.9	1.57	Plains	Grain	0.617	1.73	6.21
Phillips	1632.9	2.86	Plains	Grain & Stock	0.316	1.55	5.03
Roosevelt	1459.7	2.56	Plains	Grain & Stock	0.621	2.09	7.31
Sheridan	1431.9	2.51	Plains	Grain	0.851	1.75	6.89
Valley	2414.4	4.23	Plains	Grain & Stock	0.482	3.10	4.63
District #3	7832.8	13.73			0.500	2.19	5.81
Dawson	1734.4	3.04	Plains	Grain & Stock	0.735	1.45	5.70
McCone	898.9	1.58	Plains	Grain & Stock	0.340	1.62	5.33
Prairie	808.1	1.42	Plains	Grain & Stock	0.464	1.17	4.88
Richland	1309.4	2.30	Plains	Grain & Beets	0.621	2.38	7.36
Wibaux	666.3	1.16	Plains	Grain	0.756	1.21	4.15
District #4	5417.1	9.50			0.557	1.63	5.72
Fergus	1713.7	3.01	Plains-Mountainous	Grain & Stock	0.397	2.83	9.65
Garfield	1578.3	2.77	Plains	Stock	0.326	0.61	2.69
Petroleum	778.1	1.36	Plains	Grain & Stock	0.467	0.68	2.63
District #5	4070.1	7.14			0.376	1.58	5.61
Cascade	1247.8	2.19	Plains-Mountainous	Grain & Stock	0.460	9.72	32.97
Chouteau	2658.3	4.66	Plains	Grain & Stock	0.670	1.10	3.25
Judith Basin	1115.3	1.96	Plains-Mountainous	Grain & Stock	0.599	1.29	4.70
Pondera	1133.2	1.99	Plains	Grain & Stock	0.683	2.19	6.15
Teton	1433.3	2.51	Plains	Grain & Stock	0.628	1.83	4.23
District #6	7587.9	13.31			0.608	2.35	8.97
Broadwater	626.7	1.10	Semi-Mountainous	Grain & Beets	0.519	1.41	4.37
Jefferson	562.0	0.99	Mountainous	Stock - Mining	0.345	2.27	7.35
Lewis & Clark	899.0	1.57	Semi-Mountainous	Stock - Grain - Mining	0.260	7.85	20.29
District #7	2087.7	3.66			0.333	4.41	12.02
Granite	385.9	0.68	Mountainous	Stock	0.225	2.67	7.61
Mineral	276.2	0.48	Mountainous	Lumbering	0.224	2.35	5.69
Missoula	415.5	0.73	Semi-Mountainous	Grain-Beets-Stock	0.160	19.41	52.42
Powell	494.4	0.87	Semi-Mountainous	Stock	0.212	4.21	12.54
Ravelli	603.3	1.06	Semi-Mountainous	Truck - Fruit - Stock	0.252	6.09	17.10
Sanders	569.0	1.00	Semi-Mountainous	Grain - Stock	0.199	2.81	10.00
District #8	2744.3	4.82			0.209	6.26	17.72
Beaverhead	1023.4	1.79	Mountainous	Hay - Stock	0.181	2.33	6.50
Deer Lodge	195.5	0.34	Mountainous	Dairy Products - Hay	0.262	17.65	83.34
Madison	986.3	1.74	Semi-Mountainous	Stock - Hay	0.272	2.00	6.41
Silver Bow	317.6	0.56	Mountainous	Mining - Truck Vegetables	0.437	38.56	179.37
District #9	2522.8	4.43			0.235	7.95	34.18
Gallatin	1073.4	1.88	Semi-Mountainous	Grain - Vegetables - Stock	0.436	5.63	15.02
Meagher	549.8	0.96	Mountainous	Hay - Stock	0.232	1.33	4.13
Park	577.6	1.01	Semi-Mountainous	Grain - Stock - Hay	0.220	6.49	18.91
Sweet Grass	471.6	0.83	Semi-Mountainous	Grain - Stock - Hay	0.257	2.63	8.36
Wheatland	556.3	0.98	Plains	Grain - Stock - Hay	0.394	1.53	6.74
District #10	3228.7	5.66			0.301	3.90	11.46

Table 21 (Continued)

County	Length in Miles	Percent of Total	Topography	Land Use	Miles Per Sq. Mi. of Land Area	Motor Veh. Per Mile	Pop. Per Mile
Big Horn	952.1	1.67	Plains	Grain - Stock	0.192	2.57	8.97
Carbon	723.7	1.27	Semi-Mountainous	Grain - Stock	0.351	4.43	17.37
Golden Valley	709.1	1.24	Plains	Grain	0.583	0.69	3.00
Musselshell	1009.3	1.76	Plains	Grain - Stock	0.555	1.76	7.18
Stillwater	984.4	1.73	Plains	Grain - Stock	0.553	1.82	6.35
Treasure	295.7	0.52	Plains	Grain - Stock	0.308	1.57	5.62
Yellowstone	1491.4	2.61	Plains	Grain - Stock - Beets	0.572	7.73	20.64
District #11	6165.7	10.80			0.400	3.53	11.22
Carter	1004.3	1.76	Plains	Grain - Stock	0.297	1.05	4.12
Custer	809.2	1.42	Plains	Grain - Stock	0.216	3.96	13.89
Fallon	913.8	1.60	Plains	Grain - Stock	0.568	1.28	5.00
Powder River	997.9	1.75	Plains	Grain - Stock	0.299	0.84	3.92
Rosebud	1104.5	1.94	Plains	Grain - Stock	0.222	1.63	6.65
District #12	4829.7	8.47			0.283	1.67	6.46
Statewide	57028.5	100.00			0.391	2.93	9.43

From the standpoint of land area served by the Land Service System we find as an average that there are 0.391 miles of road for each square mile of land area. There are 28 counties in which there is less than average mileage and 28 counties in which there is more than the average mileage per square mile. Of the total number of counties in which the mileage per square mile is less than average, 17 are mountainous or semi-mountainous. When classified in ranges, low, those below 0.300, medium from 0.300 to 0.600, and high, those above 0.600; we find 21 counties in the first class, 23 in the second class, and 12 in the third class, these being Hill, Liberty, Toole, Daniels, Roosevelt, Sheridan, Dawson, Richland, Wibaux, Chouteau, Pondera, and Teton. In all these counties agriculture is the principal industry, and highway transport facilities are provided to facilitate farm-to-market traffic.

In connection with vehicles served per mile of road, we find the average for the state to be 2.93 with a range from 0.61 in Garfield County to 38.56 in Silver Bow County.

The average population served per mile of the system is 9.43 with a range, 1.84 in Liberty County to 179.3 in Silver Bow County.

2.053 Inventory of the Land Service System

Data at hand would indicate that the Land Service System has reached a high degree of development when viewed in the light of the small amount of traffic served. The system is sufficient physically for low volumes of traffic. In composite the picture may be presented as follows:

Table 22A

INVENTORY OF THE LAND SERVICE SYSTEM CLASSIFIED BY

ADMINISTRATIVE SECTIONS AND AVERAGE TRAFFIC VOLUMES.

Legend

1 - County Roads

2 - Nat'l Forest Highways

3 - Nat'l Forest Development

4 - Nat'l Indian Reservation

5 - Nat'l Parks

6 - Nat'l Military

7 - Federal Aid

8 - All Road Systems

County		Concrete		High Type Bit.		Low Type Bit.		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	1					3.3	31	107.6	55	144.6	31	9.6	17	354.7	12	63.5	2	683.3	22
	3									2.5	16			299.1	9	4.0	11	235.6	9
	5					30.7	172	5.6	167									36.3	171
Flathead	8					34.0	158	113.2	60	147.1	29	9.6	17	583.8	11	67.5	3	955.2	24
	1							1.6	18	66.7	41	5.8	24	434.4	17	109.2	6	617.7	18
	3											1.5	2	13.7	2			15.2	2
	4							17.4	88	6.2	41	5.5	31	51.8	24	4.2	3	85.1	38
Lake	8							19.0	82	72.9	41	12.8	25	499.9	17	113.4	6	718.0	20
	1							9.7	25	32.7	27			237.8	11	32.5	1	312.7	10
	3									12.6	41			339.3	7	15.2	3	367.1	10
Lincoln	8							9.7	25	45.3	31			577.1	8	47.7	2	679.8	10
	1					3.3	31	118.9	52	244.0	33	15.4	20	1,026.9	14	205.2	4	1,613.7	18
	3									15.1	37	1.5	2	582.1	8	19.2	5	617.9	9
	4							17.4	88	6.2	41	5.5	31	51.8	24	4.2	3	85.1	38
	5					30.7	172	5.6	167									36.3	171
Dist. #1	8					34.0	158	141.9	61	265.3	32	22.4	21	1,660.8	12	288.6	4	2,353.0	19
	1									58.6	35	148.5	27	601.1	17	590.3	3	1,398.6	13
	4									2.2	140			29.5	96	12.7	13	44.4	74
Bleine	8									60.8	39	148.6	27	630.6	20	603.0	4	1,443.0	15
	1									1.6	7	63.1	38	100.0	23	547.1	7	711.8	12
	4							14.2	15	4.8	164	14.5	37	68.6	26	21.7	16	123.8	29
	5					39.3	126	1.6	62					2.0	1			42.9	118
Glacier	8					39.3	126	15.8	20	6.4	124	77.6	38	170.6	24	568.8	7	878.5	79
	1							1.5	69	29.6	60	204.8	31	836.2	10	1,888.3	2	2,960.4	7
	4									1.2	61	23.2	20					24.4	22
Hill	8							1.5	69	30.8	60	228.0	31	836.2	10	1,888.3	2	2,984.8	9
	1									4.1	17	21.4	11	473.9	10	695.8	2	1,195.2	5
Liberty	8									4.1	17	21.4	11	473.9	10	695.8	2	1,195.2	5
	1							18.7	9	43.5	36	283.2	38	519.2	11	822.6	3	1,687.2	12
Toole	8							18.7	9	43.5	36	283.2	38	519.2	11	822.6	3	1,687.2	12
	1							20.2	13	137.4		721.1		2,530.4		4,544.1		7,953.2	10
	4							14.2	15	8.2	142	37.7	26	98.1	47	34.4	15	192.6	38
	5					39.3	126	1.6	62					2.0	1			42.9	118
Dist. #2	8					39.3	126	36.0	16	145.6	12	758.8	31	2,630.5	14	4,578.5	3	8,188.7	11
	1							70.8	40	62.3	26	90.9	21	477.8	13	192.1	4	893.9	15
Daniels	8							70.8	40	62.3	26	90.9	21	477.8	13	192.1	4	893.9	15
	1							6.5	137			160.2	19	698.0	10	757.0	2	1,621.7	8
	3													5.2	52			5.2	52
	4													6.0	8			6.0	8
Phillips	8							6.5	137			160.2	19	709.2	11	757.0	2	1,632.9	8
	1					0.4	532			145.7	27	118.0	20	627.7	13	484.9	2	1,376.7	12
	4									42.6	14	10.6	33	22.4	13			75.6	17
	7									7.4	85							7.4	85
Roosevelt	8					0.4	532			195.7	27	128.6	21	650.1	13	484.9	2	1,459.7	13
	1							4.9	102	47.5	43	146.2	34	844.2	14	389.1	7	1,431.9	15
Sheridan	8							4.9	102	47.5	43	146.2	34	844.2	14	389.1	7	1,431.9	15
	1							1.0	63	27.5	51	167.6	24	977.5	13	1,198.2	3	2,371.8	10
	4									10.4	16	20.3	32	9.2	21	2.7	10	42.6	24
Valley	8							1.0	63	37.9	41	187.9	25	986.7	13	1,200.9	3	2,414.4	10
	1					0.4	532	83.2	52	283.0	32	682.9	24	3,625.2	13	3,021.3	3	7,696.0	
	3													5.2	52			5.2	52
	4									53.9	14	30.9	32	37.6	14	2.7	10	124.2	19
	7									7.4	85							7.4	85
Dist. #3	8					0.4	532	83.2	52	343.4	31	713.8	25	3,668.0	13	3,024.0	3	7,832.8	12
	1	0.3				0.4		0.9	4	101.2	25	138.1	17	579.1	12	914.4	2	1,734.4	8
Dawson	8	0.3				0.4		0.9	4	101.2	25	138.1	17	579.1	12	914.4	2	1,734.4	8
	1									66.8	24	74.6	23	563.6	10	193.9	4	898.9	11
McCone	8									66.8	24	74.6	23	563.6	10	193.9	4	898.9	11

Table 22A (Continued)

County		Concrete		High Type Bit.		Low Type Bit.		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	1							2.1	6	37.4	24	49.5	14	383.3	7	335.8	1	808.1	6
Prairie	8							2.1	6	37.4	24	49.5	14	383.3	7	335.8	1	808.1	6
	1									154.6	21	26.5	13	765.1	11	363.2	2	1,309.4	10
Richland	8									154.6	21	26.5	13	765.1	11	363.2	2	1,309.4	10
	1							14.7	31	42.9	18	8.3	5	238.5	9	361.9	2	666.3	6
Wibaux	8							14.7	31	42.9	18	8.3	5	238.5	9	361.9	2	666.3	6
	1	0.3				0.4		17.7	27	402.9	23	297.0	17	2,529.6	10	2,169.2	2	5,417.1	8
Dist. #4	8	0.3				0.4		17.7	27	402.9	23	297.0	17	2,529.6	10	2,169.2	2	5,417.1	8
	1							59.1	63	188.1	28	105.7	24	826.0	10	527.8	4	1,706.7	12
	3															7.0	7	7.0	7
Fergus	8							59.1	63	188.1	28	105.7	24	826.0	10	534.8	4	1,713.7	12
	1									15.3	12			688.3	6	874.7	2	1,578.3	4
Garfield	8									15.3	12			688.3	6	874.7	2	1,578.3	4
	1									5.8	20	1.4	7	448.1	10	322.8	2	778.1	6
Petroleum	8									5.8	20	1.4	7	448.1	10	322.8	2	778.1	6
	1							59.1	63	209.2	26	107.1	24	1,962.4	9	1,725.3	2	4,063.1	8
	3															7.0	7	7.0	7
Dist. #5	8							59.1	63	209.2	26	107.1	24	1,962.4	9	1,732.3	2	4,070.1	8
	1					7.5	259	33.0	43	148.5	47	44.7	31	777.5	13	207.6	5	1,218.8	18
	3													3.9	1	25.1	1	29.0	1
Cascade	8					7.5	259	33.0	43	148.5	47	44.7	31	781.4	13	232.7	5	1,247.8	18
	1							2.1	135	8.9	72	2.5	37	1,283.5	12	1,343.0	2	2,640.0	8
	3															7.4	6	7.4	6
	4													10.9	59			10.9	59
Chouteau	8							2.1	135	8.9	72	2.5	37	1,294.4	13	1,350.4	2	2,658.3	8
	1							43.7	21	227.5	20	107.6	12	251.6	9	382.9	3	1,013.3	10
	3													65.5	2	36.5	1	102.0	2
Judith Basin	8							43.7	21	227.5	20	107.6	12	317.1	8	419.4	3	1,115.3	9
	1									24.4	99	89.7	21	501.8	21	510.5	2	1,126.4	14
	4											2.1	15	4.2	13	0.5	26	6.8	15
Pondera	8									24.4	99	91.8	21	506.0	20	511.0	2	1,133.2	14
	1							0.3	223	56.5	32	297.9	21	476.6	14	584.4	3	1,415.7	11
	3													8.8	3	8.8	2	17.6	3
Teton	8							0.3	223	56.5	32	297.9	21	485.4	13	593.2	3	1,433.3	11
	1					7.5	259	79.1	34	465.8	36	542.4	20	3,291.0	14	3,028.4	3	7,414.2	11
	3													78.2	2	77.8	2	156.0	2
	4													2.1	15	15.1	26	17.7	42
Dist. #6	8					7.5	259	79.1	34	465.8	36	544.5	20	3,384.3	14	3,106.7	3	7,587.9	11
	1							2.1	21	38.9	69	6.6	11	332.0	13	165.0	3	544.6	14
	3													71.7	13	10.4	1	82.1	11
Broadwater	8							2.1	21	38.9	69	6.6	11	403.7	13	175.4	2	626.7	13
	1							30.2	47	23.5	41	2.5	38	309.8	11	88.8	2	454.8	14
	2							2.0	50			2.4	50	15.9	11			20.3	19
	3													71.9	10	15.0	1	86.9	9
Jefferson	8							32.2	47	23.5	41	4.9	44	397.6	11	103.8	2	562.0	13
	1					1.9	163	47.5	53	35.6	30	38.6	35	512.7	14	151.4	3	787.7	17
	2													4.5	69			4.5	69
Lewis &	3									5.5	65			74.8	8	26.5	1	106.8	9
Clark	8					1.9	163	47.5	53	41.1	35	38.6	35	592.0	14	177.9	2	899.0	16
	1					1.9	163	79.8	50	98.0	48	47.7	32	1,154.5	11	405.2	2	1,787.1	14
	2							2.0	50			2.4	50	20.4	24			24.6	28
	3									5.5	65			218.4	10	51.9	1	275.8	9
Dist. #7	8					1.9	163	81.8	49	103.5	49	50.1	33	1,393.3	13	457.1	2	2,087.7	14
	1							16.2	40	3.5	11	3.5	2	127.2	14	125.2	3	275.6	10
	3							2.9	35					85.0	8	22.4	3	110.3	7
Granite	8							19.1	40	3.5	11	3.5	2	212.2	11	147.6	3	385.9	9
	1									13.4	18			55.0	10	2.4	1	70.8	11
	3							1.8	142	6.4	23			185.2	8	12.0	1	205.4	9
Mineral	8							1.8	142	19.8	19			240.2	8	14.4	1	276.2	10
	1					2.2	429	27.3	63	48.3	41			182.9	12	33.9	2	294.6	24
	3							7.5	28			12.3	5	91.7	5	9.4	16	120.9	8
Missoula	8					2.2	429	34.8	55	48.3	41	12.3	5	274.6	11	43.3	5	415.5	19
	1							16.3	32	38.0	30	8.2	20	234.0	12	180.4	2	484.9	10
	3													37.6	6	9.9	1	47.5	5
Powell	8							16.3	32	38.0	30	8.2	20	241.6	10	190.3	2	494.4	9
	1					4.5	373	23.3	132	59.8	53			327.8	23	40.7	3	456.1	34
	3									13.2	9			124.5	6	2.2	5	139.9	7
	7									7.3	123							7.3	123

Table 22A (Continued)

County		Concrete		High Type Bit.		Low Type Bit.		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Ravalli	8					4.5	373	23.3	132	80.3	52			452.3	16	42.9	3	603.3	29
	1							0.3	7	48.9	31			305.5	15	11.7	1	366.4	17
	2									2.0	37			61.3	22			63.3	24
	3									8.1	9			86.9	4			95.0	5
	4									17.5	81			25.7	15	1.1	1	44.3	41
Sanders	8							0.3	7	76.5	41			479.4	14	12.8	1	569.0	17
	1					6.7	391	83.4	72	211.9	38	11.7	15	1,202.4	16	394.3	3	1,910.4	19
	2									2.0	37			61.3	22			63.3	24
	3							12.2	46	27.7	12	12.3	5	610.9	7	55.9	5	719.0	7
	4									17.5	81			25.7	15	1.1	1	44.3	41
	7									7.3	123							7.3	123
Dist. #3	8					6.7	391	95.6	68	266.4	41	24.0	10	1,900.3	13	451.3	3	2,744.3	17
	1							8.8	21	43.9	23	18.9	14	422.8	9	325.2	2	819.6	7
	3									2.9	7			147.4	6	53.3	1	203.6	5
	6													0.2	2			0.2	2
Beaverhead	8							8.8	21	46.8	22	18.9	14	570.4	8	378.5	2	1,023.4	7
	1							42.4	33	14.8	48	5.5	25	64.5	17	31.2	3	158.4	22
	3							2.7	115	4.2	7			15.7	1	14.5	1	37.1	10
Deer Lodge	8							45.1	38	19.0	39	5.5	25	80.2	14	45.7	3	195.5	20
	1							3.4	136	78.0	45	3.4	44	509.3	13	277.7	2	871.8	14
	3													104.1	5	10.4	1	114.5	4
Madison	8							3.4	136	78.0	45	3.4	44	613.4	12	286.1	2	986.3	12
	1	0.3				19.3	129	12.0	43	3.6	146			157.3	10	49.5	2	242.0	27
	2													4.1	11			4.1	11
	3							0.2	20	1.0	18			32.6	3	37.7	1	71.5	2
Silver Bow	8	0.3				19.3	129	12.2	43	4.6	118			194.0	15	87.2	2	317.6	22
	1	0.3				19.3	129	66.6	39	140.3	41	27.8	20	1,153.9	11	683.6	2	2,091.8	13
	2													4.1	11			4.1	11
	3							2.9	109	8.1	8			299.8	5	115.9	1	426.7	5
	6													0.2	2			0.2	2
Dist. #9	8	0.3				19.3	129	69.5	42	148.4	39	27.8	20	1,458.0	11	799.5	2	2,522.8	12
	1							101.5	60	149.3	49	54.8	22	536.2	15	134.4	3	976.2	22
	2													7.7	7			7.7	7
	3							0.4	60	3.1	10			70.5	10	13.4	5	87.4	9
	5					2.1	398											2.1	398
Gallatin	8					2.1	398	101.9	60	152.4	44	54.8	22	614.4	14	147.8	3	1,073.4	22
	1									7.7	38	2.5	14	203.6	12	101.3	2	315.1	9
	2													6.0	1			6.0	1
	3													29.3	4	199.4	1	228.7	2
Meagher	8									7.7	38	2.5	14	238.9	10	300.7	1	549.8	6
	1							16.3	56	78.5	31	32.6	18	308.5	13	65.4	2	501.3	16
	3							3.1	30	4.8	14			44.3	18	9.6	3	61.8	16
	5			3.1	307	11.4	250											14.5	262
Park	8			3.1	307	11.4	250	19.4	52	83.3	30	32.6	18	352.8	13	75.0	2	577.6	22
	1									48.5	51	5.9	7	329.3	12	29.1	2	412.8	16
	3									2.0	40			23.8	20	33.0	1	58.8	10
Sweet Grass	8									50.5	50	5.9	7	353.1	13	62.1	1	471.6	15
	1							22.8	26	39.9	33	62.5	13	185.4	7	208.7	3	519.3	10
	3													31.5	1	5.5	1	37.0	1
Wheatland	8							22.8	26	39.9	33	62.5	13	216.9	6	214.2	3	556.3	9
	1							140.6	53	323.9	41	158.3	17	1,563.0	12	538.9	3	2,724.7	16
	2													13.7	4			13.7	4
	3							3.5	36	9.9	18			199.4	11	260.9	1	473.7	6
	5			3.1	307	13.5	273											16.6	279
Dist. #10	8			3.1	307	13.5	273	144.1	53	333.8	40	158.3	17	1,776.1	12	799.8	2	3,228.7	16
	1							7.9	39	74.1	27			401.1	18	299.3	3	782.4	14
	4							23.6	112	72.6	46			60.2	9	11.9	7	168.3	39
	6					1.4	47											1.4	47
Big Horn	8					1.4	47	31.5	94	146.7	36			461.3	17	311.2	3	952.1	18
	1							15.6	24	38.4	39	59.3	15	437.2	19	98.5	1	649.0	17
	3													49.9	7	9.2	1	59.1	7
	5					15.6	262											15.6	262
Carbon	8					15.6	262	15.6	24	38.4	39	59.3	15	487.1	13	107.7	1	723.1	22
Golden	1									27.0	25	22.7	18	364.4	6	295.0	2	709.1	6
Valley	8									27.0	25	22.7	18	364.4	6	295.0	2	709.1	6

Table 22A (Continued)

County		Concrete		High Type Bit.		Low Type Bit.		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Mussel	1							8.2	22	30.8	23	9.3	18	520.2	9	440.8	2	1,009.3	6
shell	8							8.2	22	30.8	23	9.3	18	520.2	9	440.8	2	1,009.3	6
	1							14.9	79	14.2	30	7.7	19	728.4	12	209.4	2	974.6	11
	3													4.0	17	5.8	2	9.8	9
Stillwater	8							14.9	79	14.2	30	7.7	19	732.4	12	215.2	2	984.4	11
	1									49.2	23	4.8	37	191.9	8	49.8	2	295.7	10
Treasure	8									49.2	23	4.8	37	191.9	8	49.8	2	295.7	10
	1	0.5	16			21.0	108	148.5	33	202.0	35	17.0	44	810.9	9	270.6	3	1,470.5	16
Yellow	4									20.9	30							20.9	30
stone	8	0.5	16			21.0	108	148.5	33	222.9	34	17.0	44	810.9	9	270.6	3	1,491.4	16
	1	0.5	16			21.0	108	195.1	36	435.7	21	120.8	21	3,454.1	12	1,663.4	2	5,890.6	12
	3													53.9	8	15.0	2	68.9	7
	4							23.6	112	93.5	42			60.2	9	11.9	7	189.2	38
	5					15.6	262											15.6	262
	6					1.4	47											1.4	47
Dist. #11	8	0.5	16			38.0	168	218.7	44	529.2	33	120.8	21	3,568.2	12	1,690.3	2	6,165.7	13
	1									21.0	18	10.1	15	457.1	15	472.6	2	960.8	8
	3													36.4	3	7.1	1	43.5	3
Carter	8									21.0	18	10.1	15	493.5	14	479.7	2	1,004.3	8
	1	0.9	144							111.1	27	100.5	15	376.7	10	220.0	2	809.2	11
Custer	8	0.9	144							111.1	27	100.5	15	376.7	10	220.0	2	809.2	11
	1							1.8	18	84.5	31	34.0	23	553.4	6	240.1	2	913.8	8
Fallon	8							1.8	18	84.5	31	34.0	23	553.4	6	240.1	2	913.8	8
	1									32.6	12			484.3	8	386.8	2	903.7	6
	2									10.4	20			35.4	7			45.8	9
Powder	3									11.7	4			28.9	3	7.8	1	48.4	3
River	8									54.7	12			548.6	8	394.6	2	997.9	6
	1							15.0	19	66.9	22	29.3	8	728.4	8	147.9	1	987.5	8
	3													22.0	4			22.0	4
	4									22.4	18			62.2	7	10.4	13	95.0	10
Rosebud	8							15.0	19	89.3	22	29.3	8	812.6	8	158.3	2	1,104.5	8
	1	0.9	144					16.8	19	316.1	25	173.9	15	2,599.9	9	1,467.4	2	4,575.0	8
	2									10.4	20			35.4	7			45.8	9
	3									11.7	4			87.3	3	14.9	1	113.9	3
	4									22.4	18			62.2	7	10.4	13	95.0	10
Dist. #12	8	0.9	144					16.8	19	360.6	24	173.9	15	2,784.8	9	1,492.7	2	4,829.7	8
	1	2.0	69			60.5	165	960.5	47	3,268.2	33	2,906.1	24	26,093.3	12	19,846.3	2	53,130.9	11
	2							2.0	50	12.4	22	2.4	50	134.9	16			151.7	18
	3							18.6	54	78.0	20	13.8	4	2,135.2	7	618.5	2	2,864.1	7
	4							55.2	80	200.8	36	76.2	29	350.7	24	65.2	12	748.1	32
	5			3.1	307	99.1	182	7.2	144					2.0	1			111.4	180
	6					1.4	47							0.2	2			1.6	41
	7									14.7	104							14.7	104
STATEWIDE	8	2.0	69	3.1	307	161.0	174	1,043.5	49	3,574.1	33	2,998.5	24	28,716.3	12	20,530.0	2	57,028.5	12

Table 22B

TRAFFIC DENSITY CLASSIFICATION OF THE LAND SERVICE

SYSTEM BY SURFACE TYPES AND ADMINISTRATIVE SECTIONS.

Subordinate System	Surface Type	Traffic Volume Groups											Total Mileage	Ave. Tr.
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799		
County	Concrete	0.6	0.5			0.9							2.0	69
System	Low Type Bit.	4.4	0.7	8.0	6.2	27.3	6.1	2.1	2.8	1.8	0.6	0.5	60.5	165
	Plain Macadam	121.7	247.3	313.0	167.8	98.8	7.6	2.3	1.0	1.0			960.5	47
	Plain Gravel	668.6	1034.3	1014.9	413.0	111.5	18.6	7.3					3,268.2	33
	Graded & Dreined	897.0	1102.1	631.9	229.5	35.3	7.5	2.8					2,906.1	24
	Unimproved	16,771.3	6175.7	2518.5	525.0	96.6	4.9	1.3					26,093.3	12
	Primitive	19,253.2	445.5	110.6	34.3	2.4	0.3						19,846.3	2
	Composite	37,716.8	9006.1	4596.9	1375.8	372.8	45.0	15.8	3.8	2.8	0.6	0.5	53,136.9	11
Nationel	Plain Macadam				2.0								2.0	50
Forest	Plain Gravel		8.6	3.8									12.4	23
Highways	Graded & Dreined			1.2	1.2								2.4	50
	Unimproved	56.4	41.2	33.7	3.4	0.2							134.9	16
	Composite	56.4	49.8	38.7	6.6	0.2							151.7	18
National	Plain Macedam	5.6	3.5	1.7	3.3	4.0	0.2	0.2	0.1				18.6	54
Forest	Plain Gravel	31.8	24.7	11.1	10.4								78.0	20
Development	Graded & Drained	13.8											13.8	4
Highways	Unimproved	1,663.4	360.2	102.2	9.4								2,135.2	7
	Primitive	601.7	13.6	3.2									618.5	2
	Composite	2,316.3	402.0	118.2	23.1	4.0	0.2	0.2	0.1				2,864.1	7
Nationel	Plain Macedam		16.4	11.8	3.2	21.5	2.3						55.2	80
Indian	Plain Grevel	49.1	59.6	37.0	42.4	12.7							200.8	39
Reservetion	Greded & Dreined	11.6	29.8	19.1	15.7								76.2	29
Roeds	Unimproved	164.8	71.0	70.7	26.1	17.8	0.2	0.1					350.7	24
	Primitive	48.1	6.9	6.3	2.9	1.0							65.2	12
	Composite	273.6	183.7	144.9	90.3	53.0	2.5	0.1					748.1	32
National	High Type Bit.							3.1					3.1	307
Parks	Low Type Bit.		2.0	6.7	13.2	17.9	57.0	0.7	0.7	0.3			99.1	182
Highways	Plain Macedam		0.5	0.7	1.3	2.5	2.2						7.2	144
	Unimproved	2.0											2.0	1
	Composite	2.0	3.1	7.4	14.5	20.4	59.2	3.8	0.7	0.3			111.4	180
Nationel	Low Type Bit.			1.4									1.4	47
Military	Unimproved	0.2											0.2	2
Res. Roeds	Composite	0.2		1.4									1.6	41
Original	Plain Gravel		0.4	2.1	5.6	5.5	0.6	0.5					14.7	104
Federal Aid														
Projects	Composite		0.4	2.1	5.6	5.5	0.6	0.5					14.7	104
All	Concrete	0.6	0.5			0.9							2.0	69
Component	High Type Bit.							3.1					3.1	307
Systems	Low Type Bit.	4.4	3.3	16.1	19.4	45.2	63.1	2.8	3.5	2.1	0.6	0.5	161.0	174
	Plain Macadam	127.3	267.7	327.2	177.6	126.8	12.3	2.5	1.1	1.0			1,043.5	49
	Plain Gravel	749.5	1,127.6	1,068.9	471.4	129.7	19.2	7.8					3,574.1	33
	Greded & Drained	922.4	1,131.9	652.2	246.4	35.3	7.5	2.8					2,998.5	24
	Unimproved	18,658.1	6,648.1	2,725.1	563.9	114.6	5.1	1.4					28,716.3	12
	Primitive	19,903.0	466.0	120.1	37.2	3.4	0.3						20,530.0	2
	Composite	40,365.3	9,645.1	4,909.6	1,515.9	455.9	107.5	20.4	4.6	3.1	0.6	0.5	57,028.5	12

Review of the tabulations and plates which follow discloses significant data with respect to surface type and traffic usage as follows:

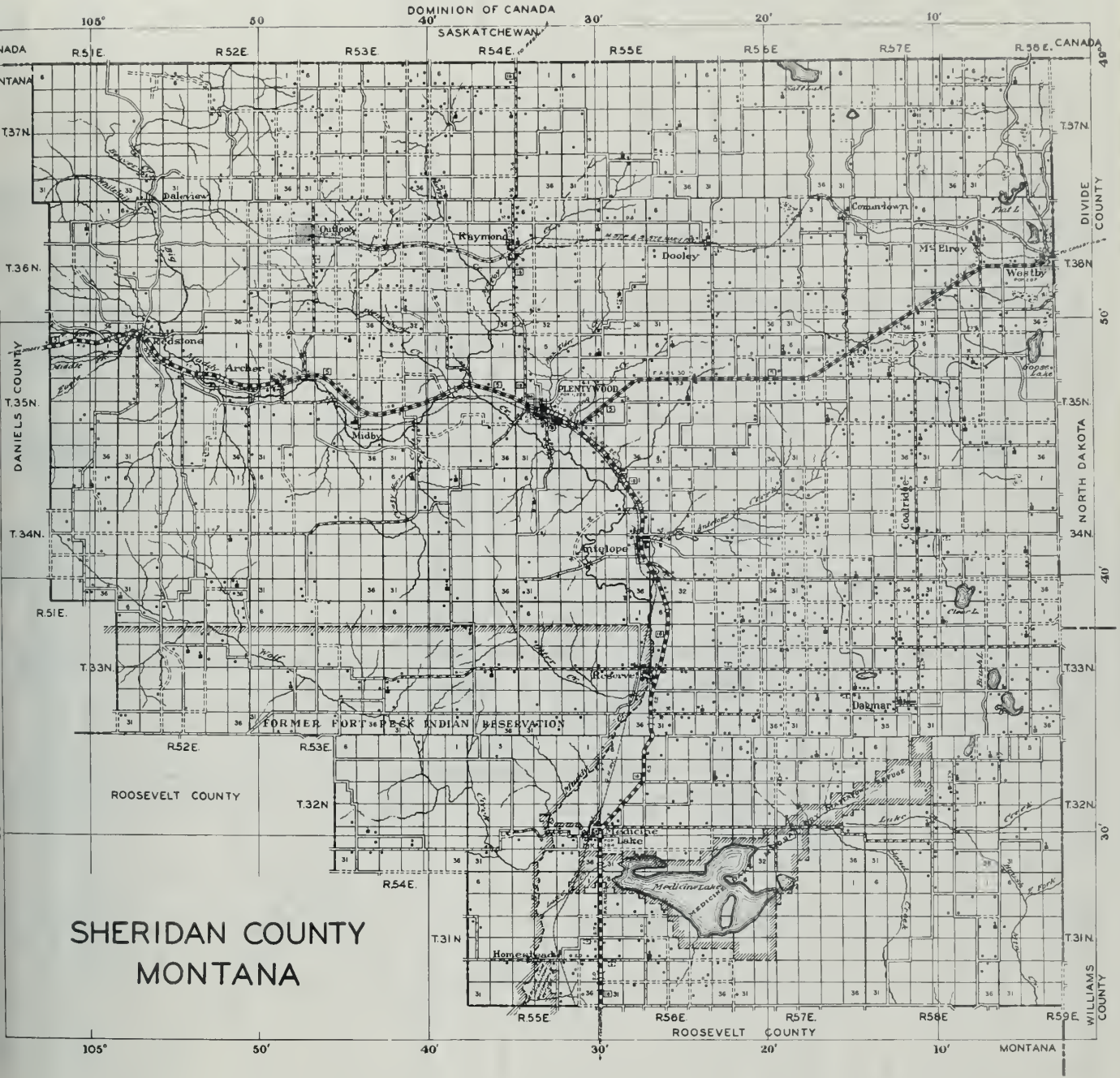
Sub-System Designation	Surface Type	Traffic Data					Counties where traffic exceeds [illegible] for each surface type.
		Avarage	Rating	Range	Modal Class	Medlan	
County Road System	Concrete	69	5.75	0-199	100-199	21	Custar
	Low Type Bituminous	165	13.75	0-790	100-199	140	Roosevelt, Cascade, Missoula, Ravalli, Gallatin
	Plain Macadam	47	3.90	0-583	25-49	33	Flathead, Hill, Velley, Fergus, Park, Phillips, Sheridan, Chouteau, Miasoula, Toton, Lewis & Clark, Ravalli, Madison, Gallatin, Stillwatar
	Plain Gravel	33	2.75	0-322	10-24	23	Lake, Blaine, Hill, Toole, Sheridan, Valley, Cascade, Chouteau, Broadwater, Pondera, Jefferson, Miasoula, Ravalli, Deer Lodge, Madison, Gallatin, Meagher, Silver Bow, Sweet Grass, Yallowstone, Carbon
	Graded & Drained	24	2.00	0-382	10-24	17	Blaine, Glacier, Hill, Toola, Sheridan, Cascade, Chouteau, Jefferson, Lewis & Clark, Deer Lodge, Madison, Treasure, Yellowstone
	Unimproved	12	1.00	0-328	0-9	7	Lake, Blaine, Glacier, Danials, Roosevelt, Sheridan, Valley, Cascade, Teton, Pondera, Broadwater, Ravalli, Granita, Lowie& Clark, Sanders, Oaer Lodge, Madison, Silver Bow, Gallatin, Park, Big Horn, Carbon, Cartar
	Primitiva	2	0.17	0-220	0-9	5	Lake, Blaine, Glacier, Toole, Oaniale, Sheridan, Valley, McCone, Fargus, Teton, Cascade, Judith, Basin, Lawis & Clark, Broadwater, Granite, Ravalli, Dear Lodge, Gallatin, Wheatland, Big Horn, Yellowstone
National Forast Highways	Plain Macadam	50	4.17	50-99	50-99	51	Jefferson - One occurrence.
	Plain Graval	23	1.92	11-45	10-24	20	Sanders
	Gradad & Orained	50	4.17	25-76	50-99	50	Jefferson - One occurrence.
	Unimproved	16	1.33	0-102	0-9	14	Lewis & Clark, Sanders
National Forest Oevalopment	Plain Macadam	54	4.50	1-476	0-9	28	Minaral, DearLodge, Gallatin
	Plain Gravel	20	1.67	4-70	0-9	14	Lincoln, Lawis & Clark, Swaet Graee, Minaral
	Graded & Drained	4	0.33	0-8	0-9	5	Miseoula
	Unimproved	7	0.58	0-71	0-9	6	Flathead, Broadwater, Lawis & Clark, Phillips, Jefferson, Granite, Minaral, Gallatin, Park, Swaet Grass, Stillwatar.
National Forest Oevelopment	Primitive	2	0.17	0-29	0-9	5	Flathead, Lincoln, Fergus, Chouteau, Granite, Miasoula, Ravalli, Lake,
National Indian Raservation	Plain Macadam	80	6.67	10-263	100-199	48	Lake, Big Horn
	Plain Gravel	39	3.25	3-115	10-24	46	Lake, Blaine, Glacier, Hill, Sandars, Big Horn
	Graded & Orained	29	2.42	4-78	10-24	22	Lake, Glaciar, Roosavalt, Valley
	Unimproved	24	2.00	0-400	0-9	12	Blaine, Glacier, Choutaau
	Primitive	12	1.0	0-164	0-9	6	Blaine, Glacier, Pondera, Rosebud
National Parks Highways	High Type Bituminous Surface	307	25.60	300-399	300-399	304	Park - One occurrance.
	Low Type Bituminous	182	15.16	10-559	200-299	216	Gallatin, Park, Carbon
	Plain Macadam	144	12.00	10-286	100-199	144	Flathead
	Unimproved	1	0.08	0-3	0-9	2	Glacier - One occurrence.
National Military Reservation Roads	Low Type Bituminous Surface	47	3.92	45-50	25-49	47	Big Horn - One occurrence.
	Unimproved	2	0.17	0-4	0-9	2	Beaverhead - One occurrance.
Original Federal Aid Projects	Plain Graval	104	8.67	10-399	50-99	92	Ravalli

Sub-Syetem Designation	Surface Type	Traffic Data					Counties wherein traffic exceeds the average for each surface type.
		Average	Rating	Range	Modal Class	Median	
All Component Systems	Concrete	69	5.75	0-199	100-199	21	Custer
	High Type Bituminous Surface	307	25.60	300-399	300-399	304	Park - One occurrence.
	Low Type Bituminous Surface	174	14.50	0-790	200-299	182	Roosevelt, Cascade, Missoula, Ravelli, Gallatin, Park, Carbon.
	Plain Macadam	49	4.08	0-583	25-49	34	Flathead, Lake, Hill, Phillipe, Valley, Sheridan, Fergus, Teton, Lewis & Clerk, Chouteau, Mineral, Missoula, Revalli, Madison, Gallatin, Park, Still water, Big Horn
All Component Systems	Plain Gravel	33	2.75	0-322	10-24	23	Lake, Blains, Glacier, Hill, Sheridan, Toole, Valley, Choutoau, Broadweter, Cascade, Jefferson, Missoula, Ravalli, Lewis & Clark, Sanders, Madison DeerLodge, Silvor Bow, Gelletin, Big Horn, Meagher Sweet Grass, Carbon, Yollowstone.
	Graded & Drained	24	2.00	0-382	10-24	21	Lake, Blaine, Glecier, Hill, Sheridan, Toole, Valley, Cascede, Choutoeu, DeerLodge, Jefferson, Lewis & Clark, Madison, Treasure, Yellowstone
	Unimproved	12	1.00	0-300	0-9	7	Lake, Blaine, Glacier, Daniels, Velley, Roosevelt Sheridan, Cascade, Chouteau, Pondera, Toton, Ravalli, Lewis & Clark, Broadwater, Sandors, DeerLodge Silver Bow, Gellatin, Park, Big Horn, Carbon, Sweet Grase, Cartor.
	Primitive	2	0.17	0-220	0-9	5	Flathead, Lake, Blaine, Glecier, Toole, Daniels, Sheridan, Cascade, Valley, McCone, Fergue, Judith Basin, Teton, Granite, Miesoula, Ravalli, Deer - Lodge, Gallatin, Wheetland, Big Horn, Yellowstone
	All Surface Types	12	1.00	0-790	0-9	6	Flathsed, Lake, Blaine, Glacier, Daniels, Roose - velt, Sheridan, Cescede, Pondera, Broadwater, Lewis & Clark, Miesoula, Ravalli, Sandors, Deer-Lodge, Galletin, Silver Bow, Park, Sweet Gress, Carbon, Big Horn, Yellowetone, Jefferson

The higher traffic volumes are on the National Parks Highways and the National Indian Reservation Roads and the higher type surface roads of the County Road System. The general average for the state at large (all systems, Federal Aid, County Trunk and the Land Service System) is 38 vehicles per day per mile.

2.054 Classification of the Land Service System by Width Groups

The classification of the Land Service System discloses a greater deficiency in widths than that of the State Secondary System. Those sections of the system improved by State and Federal agencies are adequate in most instances and the traffic volumes are correspondingly larger. Tables 23A and 23B which present data respecting widths follow hereafter.



SHOWING GRIDWORK OF LAND SERVICE ROADS NECESSARY IN
A WHEAT RAISING DISTRICT

PLATE LL-D

Usage Of The Land Service System In Terms Of Vehicle Miles

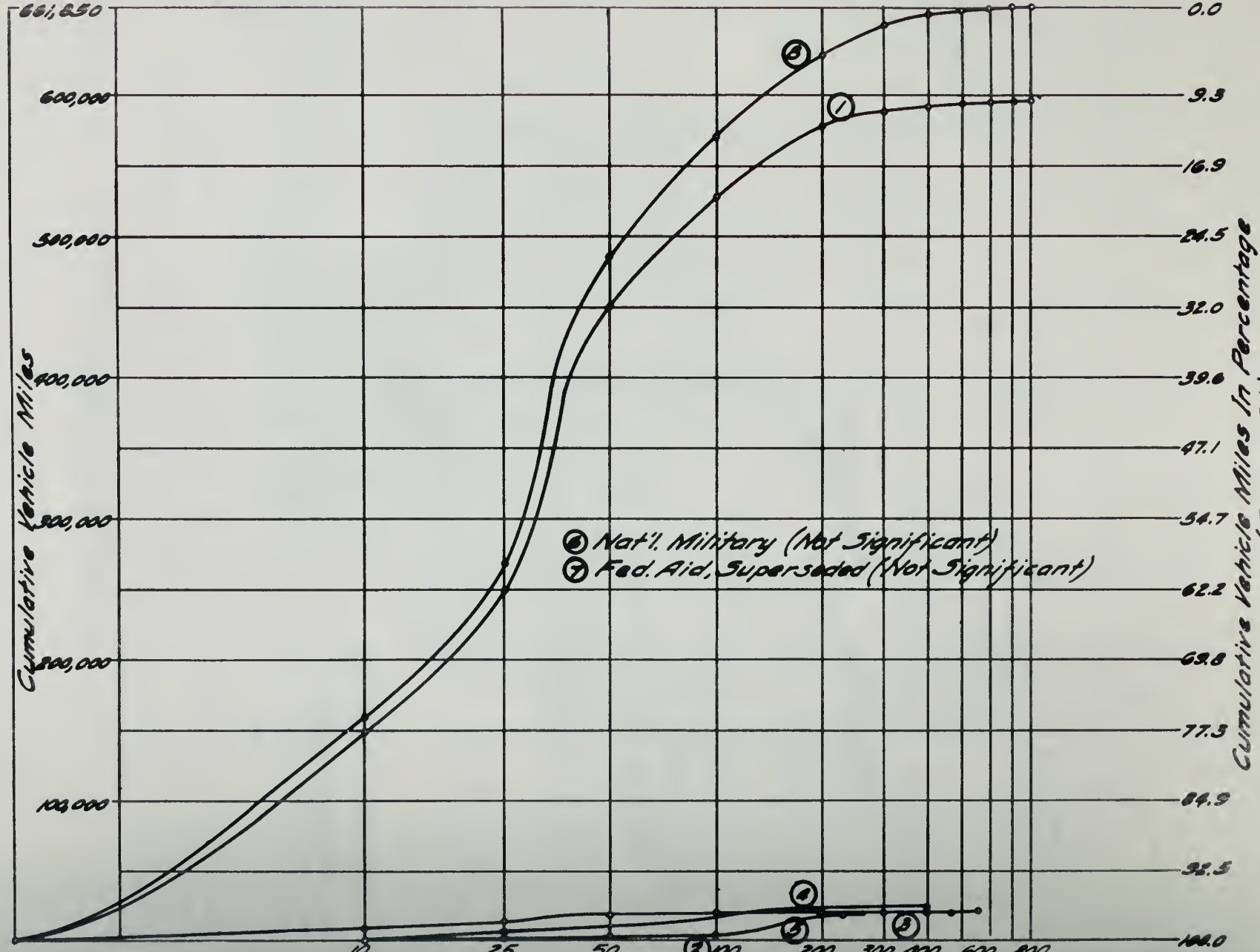


PLATE VII A

Usage Of The Land Service System Classified By Component Sub-Systems

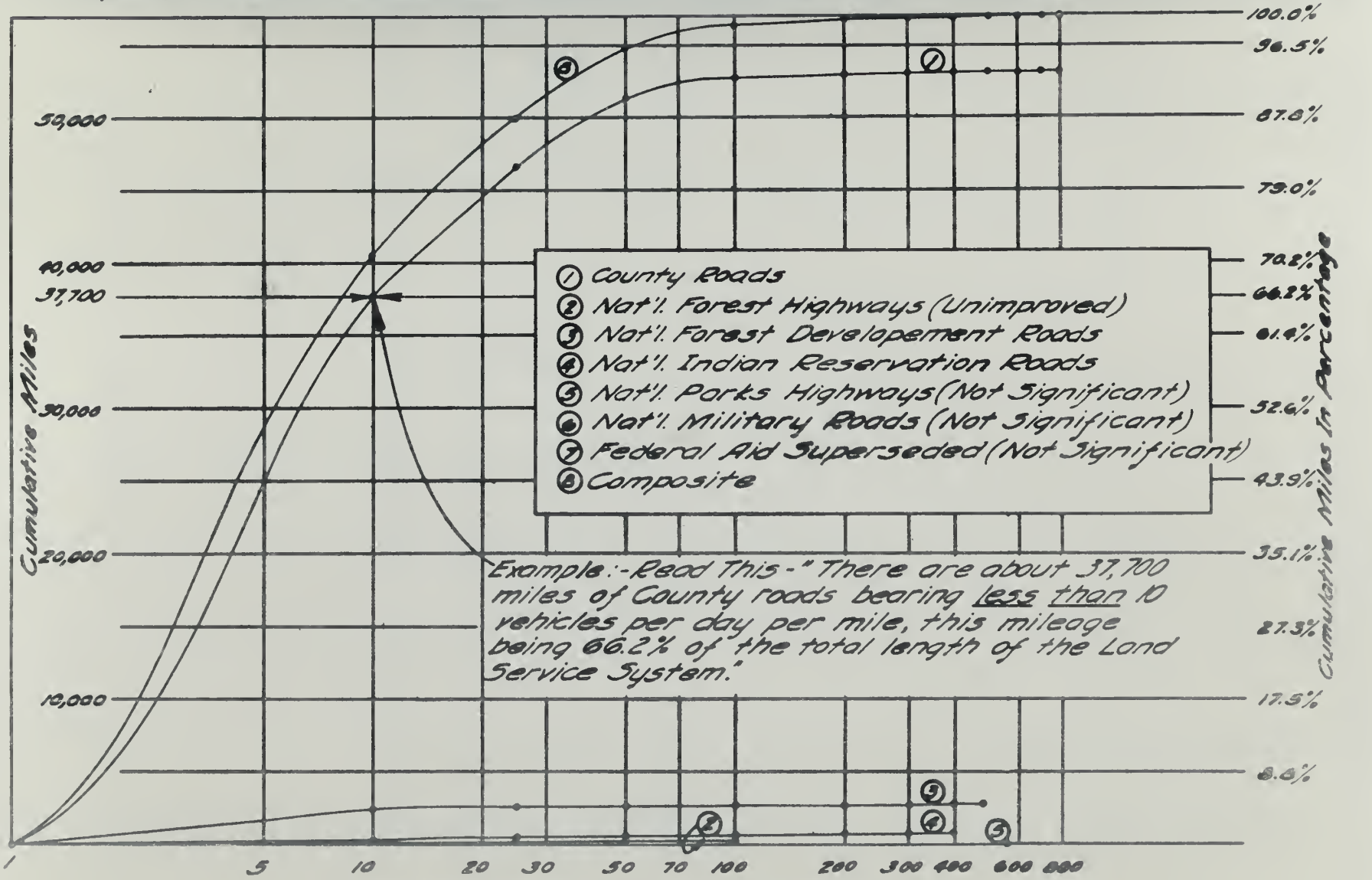


Table 23A

WIDTH CLASSIFICATION OF THE LAND SERVICE SYSTEM AND AVERAGE TRAFFIC VOLUMES

County	Concrete						High Type Bit.		Low Type Bituminous								Plain Macadam							
	16-26		36-44		45 & Over		16-26		Under 16		16-26		27-35		36-44		45 & Over		Under 16		16-26		27-35	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead											34.0	158							26.8	29	85.9	70		
Lake																			0.9	30	18.1	85		
Lincoln																			3.8	22	5.9	28		
District No. 1											34.0	158							31.5	28	109.9	70		
Blaine																								
Glacier									0.3	127	38.7	126	0.3	200					8.3	25	7.5	14		
Hill																			0.4	100	1.1	71		
Liberty																								
Toole																					18.7	9		
District No. 2									0.3	127	38.7	126	0.3	200					8.7	27	27.3	13		
Daniels																			70.8	40				
Phillips																			6.5	137				
Roosevelt											0.4	532												
Sheridan																					4.9	102		
Valley																			1.0	63				
District No. 3											0.4	532							78.3	49	4.9	102		
Dawson				0.3											0.4	-			0.9	4				
McCone																								
Prairie																					2.1	6		
Richland																								
Wibaux																			13.1	33	1.6	21		
District No. 4				0.3											0.4	-			14.0	31	3.7	13		
Fergus																			55.7	58	3.4	143		
Garfield																								
Petroleum																								
District No. 5																			55.7	58	3.4	143		
Cascade											7.5	259							19.1	41	13.7	46		
Chouteau																					2.1	135		
Judith Basin																			36.5	17	7.1	39		
Pondera																								
Teton																								
District No. 6											7.5	259							55.6	26	22.9	52		
Broadwater																					2.1	21		
Jefferson																			11.2	13	21.0	64		
Lewis & Clark											1.9	163							3.6	30	43.9	54		
District No. 7											1.9	163							14.8	17	67.0	56		
Granite																			6.3	47	12.8	36		
Mineral																					1.8	142		
Missoula											1.7	505			0.5	172			5.4	28	29.4	60		
Powell																			15.4	31	0.9	42		
Ravalli											4.3	378			0.2	250			13.5	105	9.8	168		
Sanders																					0.3	7		
District No. 8											6.0	414			0.7	194			40.6	58	55.0	76		
Beaverhead																					8.8	21		
Deer Lodge																			16.1	19	29.0	49		
Madison																					3.4	136		
Silver Bow	0.3	-							0.6	50	18.7	132									12.2	43		
District No. 9	0.3	-							0.6	50	18.7	132							16.1	19	53.4	49		
Gallatin											2.1	338							27.2	65	74.4	50		
Meagher																								
Park											10.9	250					0.5	250	11.5	28	7.9	88		
Sweet Grass																								
Wheatland																			22.8	26				
District No. 10											13.0	274					0.5	250	61.5	44	82.3	61		
Big Horn											1.4	47							15.8	76	15.7	112		
Carbon											15.6	262							15.6	262				
Golden Valley																								
Musselshell																			7.7	21	0.5	34		
Stillwater																			13.7	84	0.9	20	0.3	2
Treasure																								
Yellowstone	0.5	16							2.2	51	18.4	117	0.1	50	0.2	-	0.1	-	129.1	31	16.5	56	2.5	2
District No. 11	0.5	16							2.2	51	35.4	176	0.1	50	0.2	-	0.1	-	101.9	38	33.6	81	2.8	2
Carter																								
Custer			0.4	144	0.5	144																		
Fallon																					1.8	18		
Powder River																								
Rosebud																			6.9	12	8.1	24		
District No. 12			0.4	144	0.5	144													6.9	12	9.9	23		
STATEWIDE	0.8	10	0.4	144	0.8	90	3.1	307	3.1	58	155.6	177	0.4	162	1.3	105	0.6	208	565.6	46	473.3	61	2.8	2

County	Plain Macadam									
	36-44		45 & Over							
	Mi.	Tr.	Mi.	Tr.						
Flathead	0.5	76								
Lake										
Lincoln										
District No. 1	0.5	76								
Blaine										
Glacier										
Hill										
Liberty										
Toole										
District No. 2										
Daniels										
Phillips										
Roosevelt										
Sheridan										
Valley										
District No. 3										
Dawson										
McCone										
Prairie										
Richland										
Wibaux										
District No. 4										
Fergus										
Garfield										
Petroleum										
District No. 5										
Cascade									0.2	55
Chouteau										
Judith Basin									0.1	70
Pondera										
Teton									0.3	223
District No. 6									0.6	142
Broadwater										
Jefferson										
Lewis & Clark										
District No. 7										
Granite										
Mineral										
Missoula										
Powell										
Ravalli										
Sanders										
District No. 8										
Beaverhead										
Deer Lodge										
Madison										
Silver Bow										
District No. 9										
Gallatin									0.3	60
Meagher										
Park										
Sweet Grass										
Wheatland										
District No. 10									0.3	60
Big Horn										
Carbon										
Golden Valley										
Musselshell										
Stillwater										
Treasure										
Yellowstone									0.4	-
District No. 11									0.4	-
Carter										
Custer										
Fallon										
Powder River										
Rosebud										
District No. 12										
STATEWIDE	0.5	76							1.3	79

Table 23A (Continued)

WIDTH CLASSIFICATION OF THE LAND SERVICE SYSTEM AND AVERAGE TRAFFIC VOLUMES

County	Plain Gravel										Graded & Drained						Unimproved										Primitive					
	Under 16		16-26		27-35		36-44		45 & Over		Under 16		16-26		27-35		Under 16		16-26		27-35		36-44		45 & Over		Under 16		16-26		27-35	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	80.5	21	66.6	38									9.6	17			307.3	5	276.5	18							67.5	3				
Lake	23.9	31	49.0	46							1.5	2	11.3	28			139.5	13	360.4	19							113.4	6				
Lincoln	35.9	28	9.4	44													522.5	7	54.4	18			0.2	120			47.7	2				
Dist. #1	140.3	24	125.0	41							1.5	2	20.9	23			969.3	7	691.3	19			0.2	120			226.6	4				
Blaine	21.4	32	39.4	44							1.1	1	147.5	27			88.6	9	541.6	22					0.4	55	602.2	4	0.8	10		
Glacier	3.9	200	2.5	7									77.6	38			3.4	1	156.4	23	10.8	58					568.8	7				
Hill	18.6	66	12.2	45									228.0	29			55.3	3	780.9	11							1888.3	2				
Liberty	4.1	17											21.4	11			5.9	3	465.1	10	2.9	5					695.8	2				
Toole	21.7	20	21.6	51					0.2	125			270.5	27	12.7	224	10.6	5	497.9	11	10.7	14					622.6	3				
Dist. #2	69.7	46	75.7	45					0.2	125	1.1	1	745.0	28	12.7	224	163.8	6	2141.9	14	24.4	32			0.4	55	4577.7	3	0.8	10		
Daniels	60.1	25	2.2	54									90.9	21			18.9	3	457.2	14	1.7	12					192.1	4				
Phillips													160.2	20			43.9	9	665.3	11							757.0	2				
Roosevelt	189.1	26	6.3	44	0.3	150							128.6	21			13.8	6	636.3	13							484.9	2				
Sheridan	18.0	36	29.5	47									144.7	33	1.5	65	98.2	8	746.0	15							389.1	7				
Valley	29.3	35	8.6	63									184.8	25	3.1	12	38.2	8	941.4	13	7.1	91					1200.9	3				
Dist. #3	296.5	27	46.6	50	0.3	150							709.2	25	4.6	29	213.0	8	3146.2	13	8.8	75					3024.0	3				
Dawson	72.4	19	28.2	42					0.6	-			138.1	17			128.4	8	450.5	13			0.2	-			914.4	2				
McCone	60.8	25	5.7	14					0.3	-	7.1	37	47.5	22			127.6	6	435.0	11	1.0	-					186.6	2	7.3	68		
Prairie	18.3	27	19.1	20									49.5	14			93.4	5	289.2	8	0.3	-	0.4	-			335.8	1				
Richland	135.4	23	18.7	17					0.5	46			26.5	13			71.3	6	692.3	11	1.4	-			0.1	-	363.2	2				
Wibaux	25.3	11	17.6	28									8.3	5			10.2	3	227.9	9	0.3	-			0.1	-	361.9	2				
Dist. #4	312.2	22	89.3	27					1.4	33	7.1	37	289.9	17			430.9	6	2094.9	11	3.0	-	0.6	-	0.2	-	2161.9	2	7.3	68		
Fergus	157.7	23	30.3	53			0.1	-					105.7	24			68.7	5	754.4	11	2.5	-	0.4	-			534.8	4				
Garfield	10.0	7	3.9	29	1.1	-			0.3	-							73.0	2	598.9	6	16.2	11	0.2	-			874.7	2				
Petroleum	0.4	22	5.4	20									1.4	7			82.1	3	366.0	11							322.8	2				
Dist. #5	168.1	22	39.6	46	1.1	-	0.1	-	0.3	-			107.1	24			223.8	3	1719.3	9	18.7	9	0.6	-			1732.3	2				
Cascade	99.3	30	49.2	84							0.7	6	39.3	24	4.7	99	46.0	5	733.3	13	1.7	100	0.4	120			232.7	5				
Chouteau	8.6	74	0.3	-									2.5	37			45.3	12	1242.3	13	6.6	8			0.2	70	1347.3	2	3.1	7		
Judith Basin	202.9	20	24.6	22									107.6	12	2.0	31	73.0	3	244.1	9							419.4	3				
Pondera	14.1	35	10.3	18									89.8	21			3.4	11	404.5	20	37.1	19			1.0	6	510.5	2			0.5	2
Teton	17.8	43	38.7	27							7.2	24	290.7	20			72.8	7	412.6	15							593.2	3				
Dist. #6	342.7	26	123.1	62							7.9	23	529.9	19	6.7	79	240.5	7	3096.8	14	45.4	20	0.4	120	1.2	17	3103.1	3	3.1	7	0.5	2
Broadwater	13.5	53	25.4	78									6.6	11			234.2	12	169.5	14							175.4	2				
Jefferson	15.5	35	8.0	50									4.9	14			196.8	7	200.8	15							103.8	2				
Lewis & Clark	15.6	27	25.5	39									38.6	35			175.1	9	416.9	16							177.9	2				
Dist. #7	44.6	38	58.9	57									50.1	33			606.1	9	787.2	15							457.1	2				
Granite	3.5	11											3.5	2			140.3	10	71.9	13							147.6	3				
Mineral	19.3	20	0.5	6													222.3	7	17.9	22							14.4	1				
Missoula	37.1	20	11.2	111							12.3	5					213.9	7	59.6	24	1.1	35					43.3	5				
Powell	38.0	30											8.2	20			118.9	7	122.7	13							190.3	2				
Ravalli	54.3	49	26.0	58													282.1	9	170.2	33							42.9	3				
Sanders	66.4	35	10.1	83													315.8	11	163.6	19							12.8	1				
Dist. #8	218.6	33	47.8	75							12.3	5	11.7	15			1293.3	9	605.9	22	1.1	35					451.3	3				
Beaverhead	26.8	24	20.0	19							2.0	8	16.9	15			345.1	7	225.3	11							378.5	2				
Deer Lodge	8.7	10	10.3	64									5.5	25			46.6	7	32.6	23	1.0	11					45.7	3				
Madison	47.7	34	30.3	63									3.4	44			357.8	6	253.8	20	1.8	21					288.1	2				
Silver Bow	3.7	135	0.9	49													115.4	5	78.6	29							87.2	2				
Dist. #9	86.9	33	61.5	48							2.0	8	25.8	21			864.9	6	590.3	18	2.8	18					779.5	2				
Gallatin	48.6	26	103.8	53									54.8	22			204.4	7	408.0	17	2.0	25					147.8	3				
Meagher	3.3	14	4.4	61									2.5	14			57.9	3	101.0	13							295.7	1	5.0	2		
Park	62.2	24	21.1	47									32.6	18			65.1	9	207.7	14							75.0	2				
Sweet Grass	44.8	54	5.7	22									5.9	7			21.0	13	329.1	13							62.1	1				
Wheatland	27.3	28	12.4	43			0.2	100					62.5	13			37.1	1	179.8	8							214.2	3				
Dist. #10	186.2	32	147.4	50			0.2	100					158.3	17			388.5	7	1385.6	14	2.0	25					794.8	2	5.0	2		
Big Horn	33.2	19	113.4	41			0.1	210									165.8	8	295.5	21							311.2	3				
Carbon	13.7	36	24.7	41									19.2	15			61.4	4	425.7	20							107.7	1				
Golden Valley	11.5	19	15.5	30							3.4	31	19.3	16			147.1	5	217.3	7							295.0	2				
Musselshell	18.6	22	12.2	26									9.3	18			78.3	6	416.1	10	25.8	10					140.8	2				
Stillwater	12.1	22	2.1	76									7.7	19			40.7	4	691.7	12							214.1	2	1.1	1		
Treasure	32.0	23	17.2	25									4.8	37			141.2	6	50.7	15							49.8	2				
Yellowstone	185.7	33	37.0	36			0.2	-			0.6	8	16.4	45			152.4	5	655.5	11	2.7	-			0.3	-	270.6	3				
Dist. #11	306.8	29	222.1	38			0.3	70			4.0	28	116.8	21			786.9	6	2752.5	13	28.5	9			0.3	-	1689.2	2	1.1	1		
Cartor	4.0	23	17.0	17									10.1	15			63.4	3	430.1	15							475.7	2				
Custor	48.4	24	62.3	29	0.4	230					0.7	1	99.8	15			45.1	2	331.6	11							220.0	2				
Fallon	21.7	53	62.8	21									34.0	23			19.6	4	533.0	6	0.8	23					240.1	2				
Powder River	16.7	8	37.4	14					0.6	-							137.3	5	361.3	10							394.6	2				
Rosebud	77.4	18	11.9	46							6.3	3	23.0	9			254.2	3	555.6	10	2.3	-	0.5	-			156.3	2				
Dist. #12	168.2	24	191.4	24	0.4	230			0.6	-	7.0	3	166.9	16			569.6	4	2211.6	10	3.1	7	0.5	-			1492.7	2				
STATEWIDE	2340.8	28	1228.4	43	1.8	76	0.6	68	2.5	19	42.9	15	2931.6	23	24.0	146	6750.6	7	21823.5	13	137.8	22	2.3	31	2.1	20	20512.2	2	17.3	30	0.5	2

Table 23B
TRAFFIC DENSITY CLASSIFICATION BY SURFACE TYPE AND WIDTH
OF THE LAND SERVICE SYSTEM

Surface Type	Width Groups	Traffic Data				Traffic Volume Groups											Total Length
		Average	Range	Modal Class	Median	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	
						Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
	16-26	10	0-25	0-9	8	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
	36-44	144	89-199	100-199	133	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Concrete	45 & Over	90	0-199	100-199	111	0.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.8
High Type Bituminous	16-26	307	300-399	300-399	304	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	3.1
	Under 16	58	14-166-	50-99	58	0.0	0.4	0.9	1.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	3.1
	16-26	177	0-588	100-199	162	4.4	2.8	15.1	17.4	44.0	62.5	2.7	3.5	2.1	0.6	0.5	155.6
	27-35	162	0-301	200-299	200	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.4
Low Type	36-44	105	0-289	100-199	130	0.0	0.1	0.1	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.3
Bituminous	45 & Over	208	100-374	100-199	174	0.0	0.0	0.0	0.0	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.6
	Under 16	46	0-583	25-49	34	67.8	145.8	178.0	96.3	67.7	6.6	1.3	1.1	1.0	0.0	0.0	565.6
	16-26	61	0-399	25-49	42	56.3	121.8	149.1	80.5	58.9	5.6	1.1	0.0	0.0	0.0	0.0	473.3
	27-35	2	0-3	0-9	2	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8
Plain	36-44	76	52-100	50-99	76	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Macadam	45 & Over	79	0-399	0-9	58	0.4	0.1	0.1	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	1.3
	Under 16	28	0-322	10-24	23	490.1	738.2	701.0	309.2	84.9	12.4	5.0	0.0	0.0	0.0	0.0	2340.8
	16-26	43	0-322	10-24	23	257.4	387.9	367.4	161.9	44.6	6.5	2.7	0.0	0.0	0.0	0.0	1228.4
	27-35	76	0-322	0-9	7	1.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	1.8
Plain	36-44	68	0-265		50	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.6
Gravel	45 & Over	19	0-182	10-24	15	0.8	1.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
	Under 16	15	0-48	0-9	8	25.7	6.8	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9
Graded &	16-26	23	0-382	10-24	7	895.6	1122.8	639.5	243.3	28.7	0.4	1.3	0.0	0.0	0.0	0.0	2931.6
Drained	27-35	146	0-306	200-299	148	1.1	2.3	2.3	3.1	6.6	7.1	1.5	0.0	0.0	0.0	0.0	24.0
	Under 16	7	0-16	0-9	5	5977.1	773.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6750.6
	16-26	13	0-400	0-9	8	12637.8	5799.3	2717.9	551.4	110.7	5.0	1.4	0.0	0.0	0.0	0.0	21823.5
	27-35	22	0-115	10-24	16	40.0	75.1	7.0	12.1	3.6	0.0	0.0	0.0	0.0	0.0	0.0	137.8
	36-44	31	0-238	0-9	6	1.7	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	2.3
Unimproved	45 & Over	20	0-111	0-9	6	1.5	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1
	Under 16	2	0-300	0-9	5	19893.0	464.7	118.5	33.9	1.8	0.3	0.0	0.0	0.0	0.0	0.0	20512.2
	16-26	30	0-124	0-9	8	9.5	1.3	1.6	3.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	17.3
Primitive	27-35	2	0-4	0-9	2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	Under 16	6	0-583	0-9	6	26453.7	2129.4	1008.8	441.9	154.6	19.3	6.3	1.1	1.0	0.0	0.0	30215.2
	16-26	16	0-388	0-9	9	13861.3	7436.4	3890.6	1057.8	288.5	80.0	12.3	3.5	2.1	0.6	0.5	26633.6
	27-35	40	0-322	10-24	17	45.5	77.5	9.4	15.4	10.4	7.5	1.6	0.0	0.0	0.0	0.0	167.3
	36-44	67	0-289	0-9	63	1.8	0.3	0.3	1.1	1.1	0.5	0.0	0.0	0.0	0.0	0.0	5.1
All Types	45 & Over	53	0-399	0-9	16	3.0	1.5	0.5	0.7	1.2	0.2	0.2	0.0	0.0	0.0	0.0	7.3
TOTALS						40305.3	9645.1	4909.6	1515.9	455.9	107.5	20.4	4.6	3.1	0.6	0.5	57028.5

Of the total improved to acceptable standards (180.8 miles) there are but 3.1 miles having surface widths less than 16 feet.

2.06--City Streets and Alleys

The City Street System comprises those designated sections of the Federal Aid System within municipalities, urban extensions of the State Secondary System, and local roads, streets, and alleys. Administrative information with respect to each of the three classifications is as follows:

A. Federal Aid

The original Federal Aid Act of 1916 construes the term "Rural Post Road" to mean any public road over which the United States mails now or may hereafter be transported, excluding every street and road in a place having a population as shown by the latest available Federal census, of two thousand five hundred or more, except that portion of any such street or road along which the houses average more than two hundred feet apart. The sense of the act was amended in May 1928 to provide that "Federal funds may be expended on that portion of a highway or street within a municipality having a population of two thousand five hundred or more which from a point on the corporate limits inwardly the houses average more than two hundred feet apart. Provided, that no Federal funds shall be expended for the construction of any bridge within or partly within any municipality having a population of more than thirty thousand as shown by the latest Federal or State census". Title III of the Emergency Relief and Construction Act of 1932 provided that the limitation then in effect with respect to construction, reconstruction and bridges within municipalities should not apply. The National Industry Recovery Act allocated monies for expenditures within municipalities with previous limiting clauses rendered not applicable. The Hayden-Cartwright Act continued the policy of allocating funds for expenditure within municipalities.

As a consequence of these several funding programs, the state in collaboration with the Public Roads Administration has constructed 106.2 miles of highway through municipalities as a part of the Federal Aid System and the several cities affected have built 22.8 miles to acceptable standards. Six miles exist as a mileage used as the present traveled way and awaiting further standardized improvement.

B. Extensions of the State Secondary System.

Section 2.04 of this report discusses sources of revenue for construction within municipalities along the secondary or feeder roads or extensions thereof.

C. Local Streets and Alleys.

Funds for the construction of local streets and alleys derived from road and street taxes and Special Improvement programs.

2.061--Inventory of the City Street and Alley System

Table 24 following presents an inventory of the City Street System classified by sub-system designation and surface type and average traffic volumes.

TABLE 24

INVENTORY OF THE CITY STREET AND ALLEYS AND AVERAGE TRAFFIC VOLUMES - 1/

System Designation	Surface Type							
	Paved		Surfaced		Unsurfaced		Totals	
	Miles	Traffic	Miles	Traffic	Miles	Traffic	Miles	Traffic
Federal Aid System	117.6	1,080	11.4	463	6.0	238	135.0	915
State Secondary	12.1	412	12.8	223	6.4	128	31.3	276
Local Streets and Alleys	396.8		370.2		1266.4		2,033.4	
Totals	526.5		394.4		1278.8		2,199.7	

1/ No definitive data were procured during the field survey concerning traffic densities on local streets and alleys. When reviewing these tables, it is well to remember that the traffic survey was not conducted within the corporate limits of any municipality and traffic volumes shown hereabove are those projected inwardly from the outer limits of the several cities. Accordingly these data present estimates with respect to through traffic using city streets and highways. No attempt has been made to estimate the volume of traffic within the cities devoted to casual driving or business and industrial driving.

2.08--Distribution of Population in relation to highways

As set forth in Tables 5, 16 and 21, the data relating to the extent of the several systems in terms of land area served, population served, etc. are indeterminate in that no specific information is given concerning the relative situs of population with respect to the highways and roads of the state. As a function of the rural road inventory, all rural farm dwellings and other year round dwellings were located by the field parties and plotted on maps. By counting the houses on the map in travel distance bands, this office was enabled to assemble factual data concerning the distance the residents of the state travel to reach the Federal Aid System and the State Secondary System.

2.081--Presumptive Evidence of Completeness of House Inventory

The Federal Census of 1930 presents information to the effect that there was 86,808 dwellings in the rural areas, there being 4.1 persons per unit. Opposed to this, we find 40,046 dwellings in urban areas with 4.5 persons per dwelling. The Federal Census Bureau classifies incorporated citie and towns of less than 2,500 population as rural areas, while the rural road inventory parties considered these places as urban municipalities and made no attempt to estimate the number of houses or dwellings therein. In a densely populated unincorporated area the inventory parties in keeping with their instructions would attempt to estimate the number of dwellings which introduced further possibility of error.

It is estimated that there were 251,415 urban residents in the state in 1930 with a possible distribution of population as follows:

Urban Residents	Persons per Dwelling	No. of Dwellings
181,036	4.5	40,046
70,379	4.1	17,166
251,415	4.4	57,212

Leaving 286,191 people resident in rural areas in 69,642 dwellings.

By count of the inventory parties, we have a total of 57,615 farm units and rural dwellings in rural areas 49,961 of which are occupied. By definition a farm unit could consist of two or more dwellings, hence there is the possibility that there would be a considerable number of dwellings added to the total. Had the inventory parties considered dwellings instead of units, the total might approach that set forth in the report of the Federal Census Bureau.

It is entirely possible and probable that many dwellings were missed during the course of the survey since these parties did not enter upon seeming private roads. The point being made, however, is that this possibility would occur equally as much on the Federal Aid System as on the State Secondary, hence the data presented in Table 25 is generally correct if interpreted in terms of percentage.

With respect to churches and school houses, we find most of them to be on the more traveled roads, hence we concede no great error in counting these buildings. No attempt has been made to reconcile the survey figures with school and church authorities.

2.082 Measure of Service by Highway Systems

While we have previously described the Federal Aid System as a "through" or express highway, the State Secondary System as a secondary or feeder route and the Land Service System as one which served local residents, we find on review of the tabulations which follow that the Federal Aid System is a "feeder system" of considerable importance. If we take the counties in western Montana, we find the Federal Aid System rendering a particularly high degree of service to the rural residents. The counties are listed as follows:

Financial District No. 1 - Flathead, Lake, Lincoln
Financial District No. 6 - Cascade
Financial District No. 7 - Broadwater, Jefferson, Lewis & Clark
Financial District No. 8 - Granite, Mineral, Missoula, Powell Ravalli, Sanders
Financial District No. 9 - Beaverhead, Deer Lodge, Madison, Silver Bow
Financial District No. 10 - Gallatin, Meagher, Park

The topography of these counties is such that the population is centered in the valleys and the population is restricted to a smaller area than in eastern Montana. Similar controls occur in the location of the Federal Aid routes; these roads follow the river valleys in most instances and the obvious result is a greater measure of service per mile. Continuing, we find that 38.5% of the total rural population in the western district, is immediately served by the Federal Aid System, and but 31.5% is 5 or more miles removed by travel distances from the Federal Aid System. In eastern Montana, we find that 22.9% of the rural population is immediately served by the Federal Aid System and 57.8% is 5 miles or more removed from the Federal Aid System.

Tables 25 and 26 as follows present detailed data in connection with system use.

Table 25

SHOWING MEASURE OF SERVICE BY ROAD SYSTEMS

"Immediately Served", within one mile

County	Farm Units & Rural Dwellings			Measure of Service by Systems					
				Federal Aid System			State Secondary System		
	Total	Unoccupied	Occupied	Immediately Served	Per Mile	% of Total No.	Immediately Served	Per Mile	% of Total No.
Flathead	2,252	138	2,114	923	4.7	43.7	217	4.4	10.3
Lake	1,093	189	1,714	474	5.4	27.6	247	3.3	14.4
Lincoln	851	88	763	270	1.4	35.4	12	0.2	1.6
District #1	5,006	415	4,591	1,667	3.5	36.3	476	2.7	10.4
Blaine	1,222	169	1,053	167	3.1	15.9	65	1.1	6.2
Glacier	791	69	722	205	1.2	28.4	71	4.8	9.8
Hill	1,699	376	1,323	287	3.5	21.7	31	0.8	2.3
Liberty	700	197	503	193	7.8	38.4	137	3.7	27.3
Toole	1,463	306	1,157	236	2.7	20.4	14	3.0	1.2
District #2	5,875	1,117	4,758	1,088	2.6	22.8	318	2.0	6.7
Daniels	734	50	684	199	4.2	29.1	30	0.6	4.4
Phillips	1,001	132	869	74	0.6	8.5	74	0.5	8.5
Roosevelt	951	74	877	179	1.2	20.4	22	0.5	2.5
Sheridan	1,416	110	1,306	193	2.5	14.8	47	2.9	3.6
Valley	1,774	242	1,532	275	2.8	18.0	49	0.6	3.2
District #3	5,876	608	5,268	920	1.9	17.5	222	0.6	4.2
Dawson	1,133	152	981	230	2.2	23.5	48	2.0	4.9
McCone	488	41	447	85	0.9	19.0	47	1.8	10.5
Prairie	440	93	347	80	2.8	23.1	96	1.5	27.7
Richland	1,088	73	1,015	208	2.3	20.5	285	2.5	28.1
Wibaux	491	80	411	43	2.7	10.5	44	1.7	10.7
District #4	3,640	439	3,201	646	2.0	20.2	520	2.0	16.2
Fergus	1,875	292	1,583	249	1.4	15.7	299	1.8	18.9
Garfield	736	99	637	230	1.2	36.1	46	0.6	7.2
Petroleum	393	109	284	71	1.8	25.0	12	0.5	4.2
District #5	3,004	500	2,504	550	1.3	21.9	357	1.3	14.3
Cascade	2,071	227	1,844	769	4.0	41.7	206	2.5	11.2
Chouteau	2,121	634	1,487	110	1.5	7.4	212	1.2	14.3
Judith Basin	1,050	180	870	125	2.2	14.4	88	4.9	10.1
Pondera	1,286	198	1,088	191	3.7	17.6	123	2.6	11.3
Teton	1,447	242	1,205	214	2.3	17.8	74	3.0	6.1
District #6	7,975	1,481	6,494	1,409	3.0	21.7	703	2.0	10.8
Broadwater	541	90	451	97	1.2	21.5	7	0.5	1.6
Jefferson	609	62	547	217	2.1	39.7	66	1.9	12.1
Lewis & Clark	955	101	854	263	1.4	30.8	76	1.0	8.9
District # 7	2,105	253	1,852	577	1.5	31.2	149	1.2	8.0
Granite	328	41	287	171	1.9	59.6	18	1.3	6.3
Mineral	347	30	317	222	2.8	70.0	77	9.1	24.2
Missoula	1,266	60	1,206	775	6.1	64.2	470	5.0	39.0
Powell	576	57	519	192	1.9	37.0	91	1.6	17.5
Ravalli	1,816	78	1,738	645	6.3	37.1			
Sanders	1,041	122	919	386	2.3	42.0	16	0.5	1.7
District #8	5,374	388	4,986	2,391	3.6	47.9	672	3.2	13.5
Beaverhead	1,058	175	883	169	2.0	19.1	97	0.4	11.0
Deer Lodge	311	21	290	176	4.0	60.7	145	2.7	50.0
Madison	1,333	131	1,202	331	2.3	27.5	141	2.3	11.7
Silver Bow	663	25	638	350	5.9	54.8	14	1.6	2.2
District #9	3,365	352	3,013	1,026	3.1	34.1	397	1.1	13.2

Table 25 (Continued)

County	Farm Units & Rural Dwellings			Measure of Service By Systems					
				Federal Aid System			State Secondary System		
	Total	Unoccupied	Occupied	Immediately Served	Per Mile	% of Total No.	Immediately Served	Per Mile	% of Total No.
Gallatin	1,806	130	1,676	494	6.3	29.5	326	2.8	19.4
Park	1,044	109	935	375	2.9	40.1	14	1.9	1.5
Sweet Grass	304	41	263	27	0.7	10.3	77	2.4	29.3
Meagher	263	30	233	65	0.6	27.9	17	0.3	7.3
Wheatland	384	128	256	53	1.2	20.7	26	0.7	10.2
District #10	3,801	438	3,363	1,014	2.6	30.2	460	1.8	13.7
Big Horn	1,109	63	1,046	353	2.8	33.8	106	1.7	10.1
Carbon	996	48	948	372	4.2	39.2	234	4.2	24.7
Golden Valley	575	180	395	54	1.9	13.7	23	0.3	6.3
Musselshell	704	229	475	265	2.7	55.8	56	13.0	11.8
Stillwater	1,123	194	929	162	4.3	17.4	213	2.5	22.9
Treasure	361	70	291	112	3.9	38.5	21	0.9	7.2
Yellowstone	2,640	238	2,402	1,040	8.1	43.3	480	7.9	20.0
District #11	7,508	1,022	6,486	2,358	4.4	36.4	1,135	3.2	17.5
Carter	740	116	624	80	1.6	12.8	71	0.9	11.4
Custer	636	56	580	133	0.8	22.9	55	0.5	9.5
Fallon	748	101	647	80	1.2	12.4	38	0.9	5.9
Powder River	802	119	683	127	1.4	18.6	116	1.4	17.0
Rosebud	1,160	249	911	351	2.2	38.5	165	1.3	18.1
District #12	4,086	641	3,445	771	1.5	22.4	445	1.0	12.9
STATEWIDE	57,615	7,654	49,961	14,417	2.7	28.9	5,854	1.8	11.7

Examination of these data brings forth the following important points.

(1) According to the tabulations the Federal Aid System serves approximately one and one-half times as many farm units and rural dwellings per mile as does the State Secondary System. ($\frac{2.7}{1.8}$)

(2) If we add the urban population served by the Federal Aid System to the totals for the rural areas, we find that the system is of immediate service to 61.3% of the total population, rural and urban combined. (There are 12 incorporated towns in the state whose total population is 4,159, all of which are 5 miles or more removed from the Federal Aid System. All but two of these towns, Kevin and Outlook are served immediately by the State Secondary System.)

(3) If we add the urban population served by the State Secondary System to the totals served thereby, we find the State Secondary System to be of immediate service to 39.0% of the total population, rural and urban combined. (There are 56 incorporated towns and villages in the state which are not immediately served by the State Secondary System, all but 12 of which are served by the Federal Aid System).

(4) Statistical relationships with reference to the Federal Aid System are as follows:

a. The average number of units served per mile is 2.7.

b. Values range from 0.6 units per mile in Phillips and Meagher counties to 8.1 units per mile in Yellowstone County.

c. 1,732.6 (32.0%) miles serve rural residents at the rate of 1.5 units per mile; 1,715.2 miles (31.6%) serve rural residents at the rate of 2.5 dwelling units per mile.

d. Half the mileage on the Federal Aid System serves less than 2.2 dwellings or farm units per mile.

e. In the low range of value, from 0.0 to 1.4, we have 15 counties; in the medium range, from 1.5 to 2.9, we have 24 counties and in the high range, 3.0 and over, we have 17 counties, these being Flathead, Lake, Blaine, Hill, Liberty, Daniels, Cascade, Pondera, Missoula, Ravalli, Deer Lodge, Silver Bow, Carbon, Stillwater, Treasure, Gallatin and Yellowstone counties.

(5) Statistical relationships with respect to the State Secondary System are as follows:

a. The average number of units served per mile is 1.8.

b. Values range from zero in Ravalli county to 13.0 in Musselshell county.

c. 1,218.5 miles (37.1%) of the system serves rural residents at the rate of approximately 0.5 houses or farm units per mile; 989.4 miles (30.1%) serves rural residents at the rate of 1.5 units per mile.

d. Half the mileage on the system serves less than 1.4 units per mile.

e. In the low range of values, from 0.0 to 1.4 we have 24 counties, in the intermediate range, 1.5 to 2.9, we have 20 counties, and in the high range, 3.0 and over, we have 12 counties, these being Flathead, Lake, Glacier, Liberty, Toole, Judith Basin, Teton, Mineral, Missoula, Carbon, Musselshell and Yellowstone.

2.083--Measure of Service by Surface Type This discussion treats with the measure of service rendered rural residents by the several systems classified by surface types. For practical purposes a surfaced road is one providing year round or all weather use, a graded and drained road will likewise provide year round use subject, however, in some instances to discretionary use during periods of the spring "break-up" and unimproved or primitive roads are practically impassable during the time of the spring thaws. The tables following show the service immediately rendered by each of the given surface types.

Table 26

SHOWING MEASURE OF SERVICE OF ALL ROAD SYSTEMS BY SURFACE TYPES

"Immediately Served" within one mile

County	Farm Units & Rural Dwellings			Measure of Service by Surface Types								
				Surfaced			Graded & Drained			Unimproved & Primitive		
	Total	Unoccupied	Occupied	Immediately Served	Per Mi.	% of Total	Immediately Served	Per Mi.	% of Total	Immediately Served	Per Mi.	% of Total
Flathead	2,252	138	2,114	1,876	3.6	88.6	14	1.0	0.7	224	0.3	10.7
Lake	1,903	189	1,714	1,014	5.0	59.1	27	1.4	1.6	673	0.9	39.3
Lincoln	851	88	763	262	1.6	34.3	23	0.7	3.0	478	0.7	62.7
District #1	5,006	415	4,591	3,152	3.6	68.7	64	1.0	1.4	1,375	0.7	29.9
Blaine	1,222	169	1,053	318	2.3	30.2	165	1.1	15.6	570	0.4	54.2
Glacier	791	69	722	286	1.3	39.6	104	1.3	14.4	332	0.4	46.0
Hill	1,699	376	1,323	344	2.6	26.0	230	1.0	17.4	749	0.3	56.6
Liberty	700	197	503	211	4.9	41.9	4	0.2	0.8	288	0.2	57.3
Toole	1,463	306	1,157	277	1.8	23.9	405	1.4	35.0	475	0.4	41.1
District #2	5,875	1,117	4,758	1,436	2.1	30.2	908	1.2	19.1	2,414	0.3	50.7
Daniels	734	50	684	354	1.9	51.8	96	1.0	14.0	234	0.3	34.2
Phillips	1,001	132	869	114	1.5	13.1	194	1.0	22.3	561	0.3	64.6
Roosevelt	951	74	877	435	1.3	49.6	122	0.8	13.9	320	0.3	36.5
Sheridan	1,416	110	1,306	389	3.0	29.8	241	1.6	18.5	676	0.5	51.7
Valley	1,774	242	1,532	474	2.9	30.9	172	0.9	11.2	886	0.4	57.9
District #3	5,876	608	5,268	1,766	1.9	33.5	825	1.1	15.7	2,677	0.4	50.8
Dawson	1,133	152	981	376	1.8	38.3	113	0.8	11.5	492	0.3	50.2
McCone	488	41	447	131	1.0	29.3	48	0.6	10.7	268	0.3	60.0
Prairie	440	93	347	123	1.3	35.4	24	0.4	6.9	200	0.3	57.7
Richland	1,088	73	1,015	438	1.8	43.2	37	0.9	3.6	540	0.4	53.2
Wibaux	491	80	411	174	2.1	42.3	11	1.3	2.7	226	0.4	55.0
District #4	3,640	439	3,201	1,242	1.6	38.8	233	0.7	7.3	1,726	0.4	53.9
Fergus	1,875	292	1,583	834	1.9	52.7	85	0.8	5.4	664	0.4	41.9
Garfield	736	99	637	245	1.8	38.5	15	0.7	2.4	377	0.2	59.1
Petroleum	393	109	384	79	1.2	27.8	1	0.7	0.4	204	0.3	71.8
District #5	3,004	500	2,504	1,158	1.8	46.2	101	0.7	4.0	1,245	0.3	49.8
Cascade	2,071	227	1,844	1,240	2.9	67.2	47	1.1	2.5	557	0.5	30.3
Chouteau	2,121	634	1,487	185	1.8	12.4	4	1.6	0.3	1,298	0.5	87.3
Judith Basin	1,050	180	870	588	1.7	67.6	69	0.6	7.9	213	0.3	24.5
Sanders	1,286	196	1,088	269	3.8	24.7	241	2.5	22.2	578	0.6	53.1
Teton	1,447	242	1,205	401	2.3	33.3	431	1.4	35.8	373	0.3	30.9
District #6	7,975	1,481	6,494	2,683	2.3	41.3	792	1.4	12.2	3,019	0.4	46.5
Broadwater	541	90	451	182	1.5	40.4	8	1.2	1.8	261	0.4	57.8
Jefferson	609	62	547	356	2.1	65.1	5	1.0	0.9	186	0.4	34.0
Lewis & Clark	955	101	854	414	1.7	48.5	27	0.6	3.2	413	0.5	48.5
District #7	2,105	253	1,852	952	1.8	51.4	40	0.7	2.2	860	0.4	46.4
Granite	328	41	287	201	1.9	70.0	2	0.1	0.7	84	0.2	29.3
Mineral	347	30	517	232	2.1	73.2	00	0.0	0.0	85	0.3	26.8
Missoula	1,266	60	1,206	1,027	5.2	85.2	6	0.4	0.5	173	0.4	14.3
Powell	576	57	519	256	1.7	49.3	4	0.5	0.8	259	0.5	49.9
Ravalli	1,816	78	1,738	1,208	7.6	69.5	9	0.2	0.5	521	1.0	30.0
Sanders	1,041	122	919	595	2.9	64.7	00	0.0	0.0	324	0.6	35.3
District #8	5,374	388	4,986	3,519	3.8	70.6	21	0.3	0.4	1,446	0.6	29.0
Beaverhead	1,058	175	883	512	1.4	35.3	12	0.6	1.4	559	0.5	63.3
Deer Lodge	311	21	290	234	1.6	80.7	11	2.0	3.8	45	0.3	15.5
Madison	1,333	131	1,202	492	2.4	40.9	7	2.1	0.6	703	0.7	58.5
Silver Bow	663	25	638	393	3.8	61.6	00	0.0	0.0	245	0.9	38.4
District #9	3,365	352	3,013	1,431	2.1	47.5	30	1.1	1.0	1,552	0.6	51.5
Gallatin	1,806	130	1,676	1,235	2.9	73.7	25	0.4	1.5	416	0.5	24.8
Park	1,044	109	935	502	2.0	53.7	59	1.5	6.3	374	0.9	40.0
Sweet Grass	304	41	263	137	1.2	52.1	3	0.5	1.1	123	0.3	46.8
Meagher	263	30	233	106	0.9	45.5	3	0.3	1.3	124	0.2	53.2
Wheatland	384	128	256	134	1.0	52.3	13	0.2	5.1	109	0.3	42.6
District #10	3,801	438	3,363	2,114	2.1	62.9	103	0.6	3.1	1,146	0.4	34.0

Table 26 (Continued)

County	Farm Units & Rural Dwellings			Measure of Service by Surfece Types								
				Surfeced			Graded & Drained			Unimproved & Primitive		
	Total	Unoccupied	Occupied	Immediately Served	Per Mi.	% of Total	Immediately Served	Per Mi.	% of Total	Immediately Served	Per Mi.	% of Total
Big Horn	1,109	63	1,046	685	2.3	65.5	4	0.5	0.4	357	0.4	34.1
Carbon	996	48	948	694	3.6	73.2	21	0.3	2.2	233	0.4	24.6
Golden Valley	575	180	395	120	1.7	30.4	39	1.2	9.9	236	0.3	59.7
Musselshell	704	229	475	228	2.1	48.0	52	1.2	10.9	195	0.2	41.1
Stillwater	1,123	194	929	353	3.1	38.0	7	0.9	0.8	569	0.6	61.2
Treasure	361	70	291	185	2.3	63.6	2	0.4	0.7	104	0.4	35.7
Yellowstone	2,640	238	2,402	2,100	3.9	87.4	7	0.4	1.1	295	0.3	11.5
District #11	7,508	1,022	6,486	4,365	3.1	67.3	132	0.8	2.0	1,989	0.4	30.7
Carter	740	116	624	125	1.6	20.0	10	1.0	1.6	489	0.5	78.4
Custer	636	56	580	245	0.8	42.2	33	0.3	5.7	302	0.4	52.1
Fallon	748	101	647	252	1.5	38.9	30	0.9	4.6	365	0.5	56.5
Powder River	802	119	683	185	1.7	27.1	21	0.8	3.1	477	0.5	69.8
Rosebud	1,160	249	911	357	1.4	39.2	205	3.6	22.5	349	0.3	38.3
District #12	4,086	641	3,445	1,164	1.3	33.8	299	1.3	8.7	1,982	0.4	57.5
STATEWIDE	57,615	7,654	49,961	24,982	2.4	50.0	3,548	1.0	7.1	21,431	0.4	42.9

Pertinent data with respect to tabulations are as follows:

(1) Fifty percent of the total rural population is immediately served by surfaced roads, i.e. these residents are immediately served by "all weather" roads.

(2) Seven and one-tenth percent of the total rural population has generally year round service.

(3) Forty-two and nine-tenths of the total population is rendered service by roads which are generally impassable under adverse weather conditions.

(4) While surfaced roads constitute but 16.0% of the total mileage, they are of immediate service to 50% of the rural population.

(5) While graded and drained roads constitute but 5.1% of the total road mileage, they are of immediate service to 7.1% of the rural residents.

(6) While unimproved and primitive roads constitute 77.2% of the total road mileage, they are of immediate service to but 42.9% of the total rural population.

Table 27

TABLE SHOWING MEASURE OF SERVICE BY SURFACE TYPES CLASSIFIED BY TRAVEL DISTANCE GROUPS

County	Farm Units & Rural Dwellings			Travel Distance Groups																	
				Surfaced										Surfaced + Gredad & Dreined							
		Unocc-	Occ-	0.0-0.9		1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0 & Over		0.0-0.9		1.0-1.9		2.0-2.9	
	Total	upied	upied	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Fletheed	2,252	138	2,114	1,876	88.7	116	5.5	37	1.8	12	0.6	38	1.8	35	1.6	1,890	89.4	116	5.5	37	1.8
Lake	1,903	189	1,714	1,014	59.1	325	19.0	128	7.5	50	2.9	38	2.2	159	9.3	1,041	60.7	325	19.0	128	7.5
Lincoln	851	88	763	262	34.3	95	12.5	52	6.8	113	14.8	105	13.8	136	17.8	285	37.3	93	12.2	49	6.4
District #1	5,006	415	4,591	3,152	68.7	536	11.7	217	4.7	175	3.8	181	3.9	330	7.2	3,216	70.6	534	11.6	214	4.7
Blaine	1,222	169	1,053	318	30.2	35	3.3	65	6.2	63	6.0	33	3.1	539	51.2	483	45.9	54	5.1	77	7.3
Glacier	791	69	722	286	39.6	100	13.9	100	13.8	23	3.2	21	2.9	192	26.6	390	54.0	94	13.0	104	14.4
Hill	1,699	376	1,323	344	26.0	98	7.4	77	5.8	66	5.0	51	3.9	687	51.9	574	43.4	173	13.1	121	9.1
Liberty	700	197	503	211	41.9	16	3.2	19	3.8	20	4.0	21	4.2	216	42.9	215	42.7	26	5.2	23	4.6
Toola	1,463	306	1,157	277	23.9	158	13.7	119	10.3	77	6.7	124	10.7	402	34.7	682	58.9	244	21.1	65	5.6
District #2	5,875	1,117	4,758	1,436	30.2	407	8.5	380	8.0	249	5.2	250	5.3	2,036	42.8	2,344	49.3	591	12.4	390	8.2
Daniels	734	50	684	354	51.7	110	16.1	62	9.1	36	5.3	33	4.8	89	13.0	450	65.8	72	10.5	49	7.2
Phillips	1,001	132	869	114	13.1	15	1.7	30	3.5	8	0.9	19	2.2	683	78.6	308	35.4	50	5.8	39	4.5
Roosevelt	951	74	877	435	49.6	91	10.4	71	8.1	50	5.7	49	5.6	181	20.6	557	63.5	97	11.1	64	7.3
Sheridan	1,416	110	1,306	389	29.8	189	14.5	96	7.4	100	7.6	76	5.8	456	34.9	630	48.2	208	15.9	131	10.0
Valley	1,774	242	1,532	474	30.9	103	6.7	57	3.7	42	2.8	66	4.3	790	51.6	646	42.2	153	10.0	93	6.1
District #3	5,876	608	5,268	1,766	33.5	508	9.7	316	6.0	236	4.5	243	4.6	2,199	41.7	2,591	49.2	580	11.0	376	7.1
Dawson	1,133	152	981	376	38.3	70	7.1	69	7.1	63	6.4	50	5.1	353	36.0	489	49.9	127	12.9	86	8.8
McCone	488	41	447	131	29.3	39	8.7	32	7.2	23	5.1	23	5.2	199	44.5	179	40.0	41	9.2	30	6.7
Prairie	440	93	347	123	35.4	22	6.3	19	5.5	21	6.1	20	5.8	142	40.9	147	42.4	26	7.5	28	8.1
Richland	1,088	73	1,015	438	43.2	97	9.6	49	4.8	45	4.4	35	3.4	351	34.6	475	46.8	100	9.9	51	5.0
Wibeux	491	80	411	174	42.3	76	18.5	47	11.4	29	7.1	18	4.4	67	16.3	185	45.0	76	18.5	47	11.4
District #4	3,640	439	3,201	1,242	38.8	304	9.5	216	6.7	181	5.7	146	4.6	1,112	34.7	1,475	46.1	370	11.5	242	7.6
Fergus	1,875	292	1,583	834	52.7	128	8.1	78	4.9	59	3.7	74	4.7	410	25.9	919	58.1	137	8.7	76	4.8
Garfield	736	99	637	245	38.5	20	3.1	16	2.5	12	1.9	9	1.4	335	52.6	260	40.9	20	3.1	16	2.5
Petroleum	393	109	284	79	27.6	14	4.9	14	4.9	15	5.3	16	5.7	146	51.4	80	28.2	14	4.9	14	4.9
District #5	3,004	500	2,504	1,158	46.2	162	6.5	108	4.3	86	3.4	99	4.0	891	35.6	1,259	50.3	171	6.8	106	4.2
Cascade	2,071	227	1,844	1,240	67.2	170	9.2	127	6.9	84	4.6	72	3.9	151	8.2	1,287	69.8	175	9.5	115	6.2
Chouteau	2,121	634	1,487	185	12.4	88	5.9	58	3.9	71	4.8	70	4.7	1,015	68.3	189	12.7	92	6.2	56	3.8
Judith Basin	1,050	180	870	588	67.6	75	8.6	32	3.7	24	2.7	19	2.2	132	15.2	657	75.5	70	8.0	24	2.8
Pondere	1,286	198	1,088	269	24.7	104	9.6	78	7.2	73	6.7	83	7.6	481	44.2	510	46.9	136	12.5	61	5.6
Teton	1,447	242	1,205	401	33.3	131	10.9	88	7.3	75	6.2	46	3.8	464	38.5	832	69.0	136	11.3	62	5.1
District #6	7,975	1,481	6,494	2,683	41.3	568	8.8	383	5.9	327	5.0	290	4.5	2,243	34.5	3,475	53.5	609	9.4	318	4.9
Broadwater	541	90	451	182	40.4	46	10.2	29	6.4	18	4.0	16	3.5	160	35.5	190	42.1	47	10.4	27	6.0
Jefferson	609	62	547	356	65.1	43	7.9	10	1.8	12	2.2	44	8.0	82	15.0	361	66.0	43	7.9	10	1.8
Lewis & Clark	955	101	854	414	48.5	83	9.7	54	6.3	55	6.4	38	4.5	210	24.6	441	51.6	75	8.8	48	5.6
Dist. #7	2,105	253	1,852	952	51.4	172	9.3	93	5.0	85	4.6	98	5.3	452	24.4	992	53.4	165	8.9	85	4.6
Granite	328	41	287	201	70.0	11	3.9	17	5.9	2	0.7	4	1.4	52	18.1	203	70.7	11	3.9	15	5.2
Minaral	347	30	317	232	73.2	38	12.0	7	2.2	5	1.6	1	0.3	34	10.7	232	73.2	38	12.0	7	2.2
Misaoula	1,266	60	1,206	1,027	85.2	71	5.9	23	1.9	13	1.1	5	0.4	67	5.5	1,033	85.7	74	6.1	23	1.9
Powell	576	57	519	256	49.3	40	7.7	40	7.7	32	6.2	21	4.1	130	25.0	260	50.1	40	7.7	39	7.5
Revalli	1,816	78	1,738	1,208	69.5	215	12.4	116	6.7	19	1.1	21	1.2	159	9.1	1,217	70.0	208	12.0	114	6.6
Sanders	1,041	122	919	595	64.8	120	13.1	49	5.3	38	4.1	15	1.6	102	11.1	595	64.8	120	13.1	49	5.3
Dist. #8	5,374	388	4,986	3,519	70.6	495	9.9	252	5.1	109	2.2	67	1.3	544	10.9	3,540	71.0	491	9.8	247	5.0
Baaverheed	1,058	175	883	312	35.3	30	3.4	27	3.1	23	2.6	30	3.4	461	52.2	324	36.7	30	3.4	27	3.1
Deer Lodge	311	21	290	234	80.7	34	11.7	10	3.5	1	0.3			11	3.8	245	85.4	34	11.7	10	3.5
Madison	1,333	131	1,202	492	40.9	92	7.7	57	4.7	60	5.0	73	6.1	428	35.6	499	41.5	88	7.3	57	4.7
Silver Bow	663	25	638	393	61.6	194	30.4	15	2.4	15	2.4	8	1.2	13	2.0	393	61.6	194	30.4	15	2.4
Dist. #9	3,365	352	3,013	1,431	47.5	350	11.6	109	3.6	99	3.3	111	3.7	913	30.3	1,461	48.5	346	11.5	109	3.6
Gallatin	1,806	130	1,676	1,235	73.7	119	7.1	106	6.3	23	1.4	6	0.4	187	11.1	1,260	75.2	112	6.7	96	5.7
Park	1,044	109	935	502	53.7	70	7.5	122	13.0	23	2.5	21	2.2	197	21.1	561	60.0	71	7.6	109	11.7
Sweet Grass	304	41	263	137	52.1	15	5.7	10	3.8	6	2.3	10	3.8	85	32.3	140	53.2	16	6.1	12	4.6
Meagher	263	30	233	106	45.5	8	3.4	6	2.6	7	3.0	5	2.1	101	43.4	109	46.8	9	3.9	7	3.0
Wheetland	384	128	256	134	52.3	64	25.0	7	2.7	3	1.2	2	0.8	46	18.0	147	57.4	65	25.4	11	4.3
Diat. #10	3,801	438	3,363	2,114	62.9	276	8.2	251	7.5	62	1.8	44	1.3	616	18.3	2,217	65.9	273	8.1	235	7.0

County	Travel Distance Groups									
	Surfaced + Gredad & Dreined									
	3.0-3.9		4.0-4.9		5.0 & Over					
	No.	%	No.	%	No.	%				
Fletheed	37	1.8	12	0.6	36	1.8	21	0.9		
Lake	128	7.5	50	2.9	38	2.2	132	7.7		
Lincoln	49	6.4	108	14.2	105	13.8	123	16.1		
District #1	214	4.7	170	3.7	181	3.9	276	5.5		
Blaine	64	6.1	20	1.9	355	33.7				
Glacier	24	3.3	19	2.7	91	12.6				
Hill	59	4.5	45	3.4	351	26.5				
Liberty	13	2.6	20	4.0	206	40.9				
Toola	32	2.8	10	0.9	124	10.7				
District #2	390	8.2	192	4.0	114	2.4	1,127	23.7		
Daniels	25	3.7	20	2.9	68	9.9				
Phillips	26	3.0	46	5.3	400	46.0				
Roosevelt	45	5.1	20	2.3	94	10.7				
Sheridan	71	5.5	41	3.2	225	17.2				
Valley	62	4.0	78	5.1	500	32.6				
District #3	229	4.4	205	3.9	1,287	24.4				
Dawson	75	7.6	40	4.1	164	16.7				
McCone	24	5.4	15	3.4	158	35.3				
Prairie	18	5.2	14	4.0	114	32.8				
Richland	43	4.2	34	3.4	312	30.7				
Wibeux	29	7.1	18	4.4	56	13.6				
District #4	189	5.9	121	3.8	815	25.5				
Fergus	59	3.7	346	21.8						
Garfield	9	1.4	320	50.2						
Petroleum	16	5.7	145	51.0						
District #5	84	3.4	611	32.4						
Cascade	62	3.4	133	7.2						
Chouteau	70	4.7	1,007	67.7						
Judith Basin	4	0.5	101	11.6						
Pondere	57	5.2	45	4.1	279	25.7				
Teton	29	2.4	16	1.3	130	10.8				
District #6	318	4.9	245	3.8	197	3.0	1,650	25.4		
Broadwater	14	3.1	14	3.1	159	35.3				
Jefferson	12	2.2	44	8.0	77	14.1				
Lewis & Clark	50	5.9	36	4.2	204	23.9				
Dist. #7	85	4.6	76	4.1	94	5.1	440	23.9		
Granite	2	0.7	4	1.4	52	18.1				
Minaral	5	1.6	1	0.3	34	10.7				
Misaoula	13	1.1	5	0.4	58	4.8				
Powell	32	6.2	20	3.8	128	24.7				
Revalli	19	1.1	21	1.2	159	9.1				
Sanders	38	4.1	15	1.6	102	11.1				
Dist. #8	109	2.2	66	1.3	533	10.7				
Baaverheed	23	2.6	30	3.4	449	50.8				
Deer Lodge										
Madison	73	6.1	60	5.0	425	35.4				
Silver Bow	15	2.4	8	1.2	13	2.0				
Dist. #9	111	3.7	111	3.7	887	29.4				
Gallatin	22	1.3	6	0.4	180	10.7				
Park	16	1.7	161	17.2						
Sweet Grass	8	3.0	81	30.8						
Meagher	5	2.1	96	41.2						
Wheetland	3	1.2	26	10.1						
Diat. #10	38	1.1	544	16.2						

Table 27 (Continued)

County	Farm Units & Rural Dwellings			Travel Distance Groups																			
				Surfaced										Surfaced & Graded & Drained									
	Total	Unoccupied	Occupied	0.0-0.9		1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0 & Over		0.0-0.9		1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0 & Over	
				No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Big Horn	1,109	63	1,046	685	65.5	63	6.0	21	2.0	17	1.6	13	1.3	247	23.6	689	65.9	63	6.0	21	2.0	17	1.6	13	1.3	243	23.2
Carbon	996	48	948	694	73.2	75	7.9	65	6.9	37	3.9	18	1.9	59	6.2	715	75.4	71	7.5	63	6.6	35	3.7	13	1.4	51	5.4
Golden Valley	575	180	395	120	30.4	17	4.3	21	5.3	53	13.4	19	4.8	165	41.8	159	40.3	21	5.3	19	4.8	23	5.8	15	3.8	158	40.0
Musselshell	704	229	475	228	48.0	26	5.5	17	3.6	11	2.3	10	2.1	183	38.5	280	58.9	36	7.1	24	5.1	16	3.4	10	2.1	109	22.9
Stillwater	1,123	194	929	353	38.0	95	10.2	21	2.3	76	8.2	34	3.6	350	37.7	360	38.8	97	10.4	25	2.7	79	8.5	38	4.1	330	35.5
Treasure	361	70	291	185	63.6	12	4.1	13	4.5	5	1.7	2	0.7	74	25.4	187	64.3	12	4.1	13	4.5	5	1.7	2	0.7	72	24.7
Yellowstone	2,640	238	2,402	2,100	87.4	46	1.9	35	1.5	31	1.3	15	0.6	175	7.3	2,107	88.5	46	1.9	35	1.5	31	1.3	15	0.6	168	6.2
Dist. #11	7,508	1,022	6,486	4,365	67.3	334	5.2	193	3.0	230	3.5	111	1.7	1,253	19.3	4,499	69.3	346	5.3	200	3.1	206	3.2	107	1.6	1,141	17.6
Carter	740	116	624	125	20.0	32	5.1	32	5.1	29	4.7	30	4.8	376	60.3	135	21.6	33	5.3	31	5.0	29	4.7	30	4.8	366	58.6
Custer	636	56	580	245	42.3	36	6.2	21	3.6	17	2.9	17	2.9	244	42.1	278	47.9	38	6.5	22	3.8	19	3.3	19	3.3	204	35.2
Fallon	748	101	647	252	38.9	78	12.1	68	10.5	36	5.6	24	3.7	189	29.2	282	43.5	82	12.7	70	10.8	37	5.7	20	3.1	156	24.2
Powder River	802	119	683	185	27.1	31	4.5	31	4.5	21	3.1	30	4.4	385	56.4	206	30.2	35	5.1	29	4.3	24	3.5	31	4.5	358	52.4
Rosebud	1,160	249	911	357	39.2	23	2.5	21	2.3	9	1.0	19	2.1	482	52.9	562	51.7	27	2.9	27	3.0	9	1.0	22	2.4	264	29.0
Dist. #12	4,086	641	3,445	1,164	33.8	200	5.8	173	5.0	112	3.2	120	3.5	1,676	48.7	1,463	42.5	215	6.3	179	5.2	118	3.4	122	3.5	1,344	39.1
STATEWIDE	57,615	7,654	49,961	24,982	50.0	4,312	8.6	2,691	5.4	1,951	3.9	1,760	3.5	14,265	28.6	28,530	57.1	4,691	9.4	2,701	5.4	1,762	3.5	1,440	2.9	10,837	21.7

2.084 Measure of Service Classified By Travel Distance

By the terms of this discussion, any farm unit or rural dwelling within a travel distance of one mile of the system or surface type under discussion is immediately served. Carrying the analysis forward we find the data presenting information as set forth in Table 27 hereinbefore and on Plate VII.

Pertinent data disclosed in Table 27 and on Plate VII are as follows:

(1) Federal Aid System

Fifty-two and three-tenths percent of the total rural population lives within five miles of the Federal Aid System by travel distance. Of that total, fifty-five and three-tenths percent lives within one mile of the Federal Aid System by travel distance.

(2) State Secondary System

Twenty-one and three-tenths percent of the total rural population lives within five miles of the State Secondary System by travel distance. Of this total, 54.9% live within one mile of the State Secondary System by travel distance.

(3) Surfaced Roads

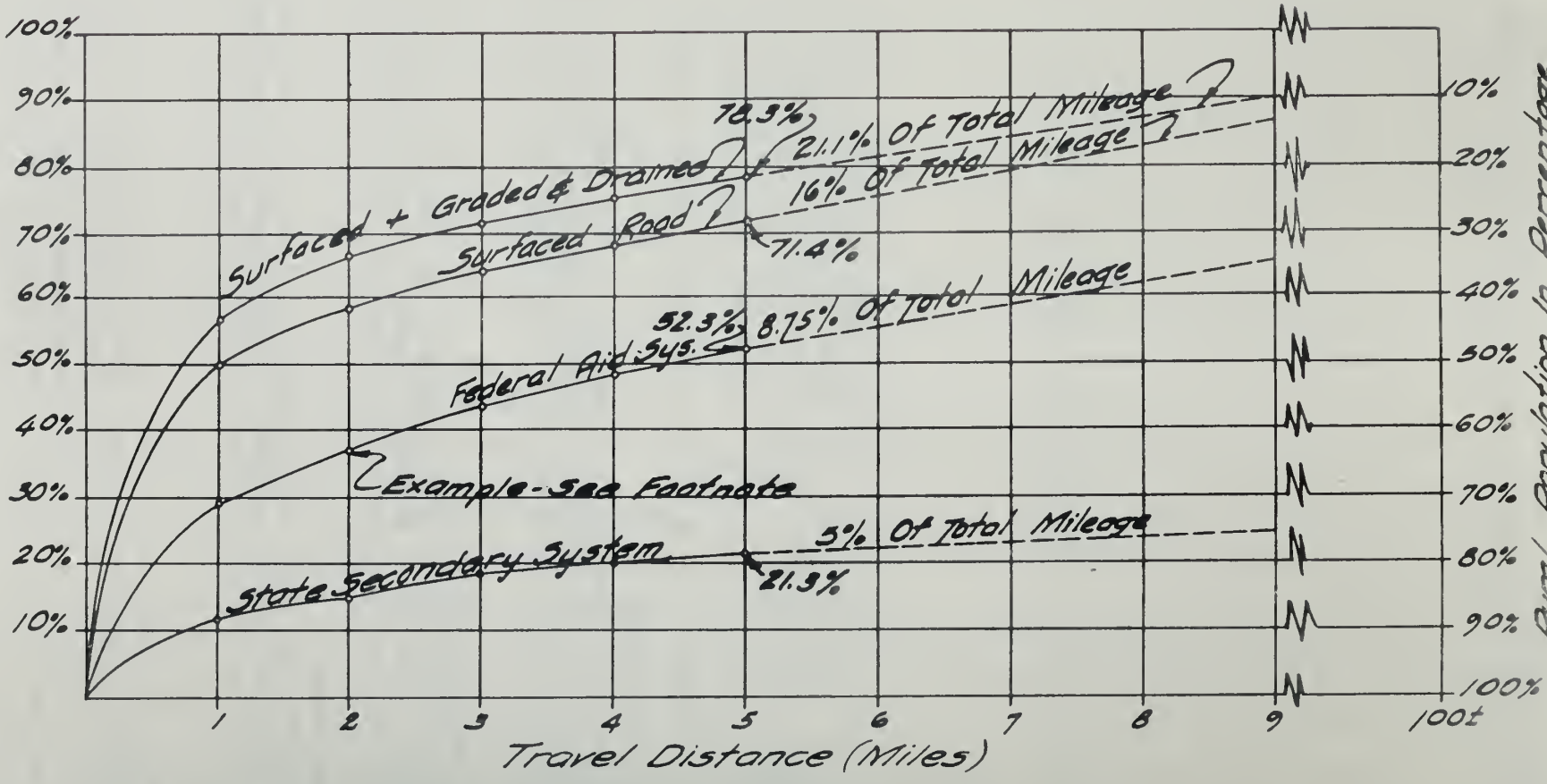
Seventy-one and four-tenths percent of the total rural population lives within five miles by travel distance of some section of surfaced road. Of this total, seventy percent lives within one mile of some section of surfaced road by travel distance.

(4) Surfaced and Graded and Drained

Seventy-eight percent of the total rural population live within five miles by travel distance of some section of road either surfaced or graded and drained. Of the total, seventy-three percent lives within one mile by travel distance of some section of road, either surfaced or graded and drained.

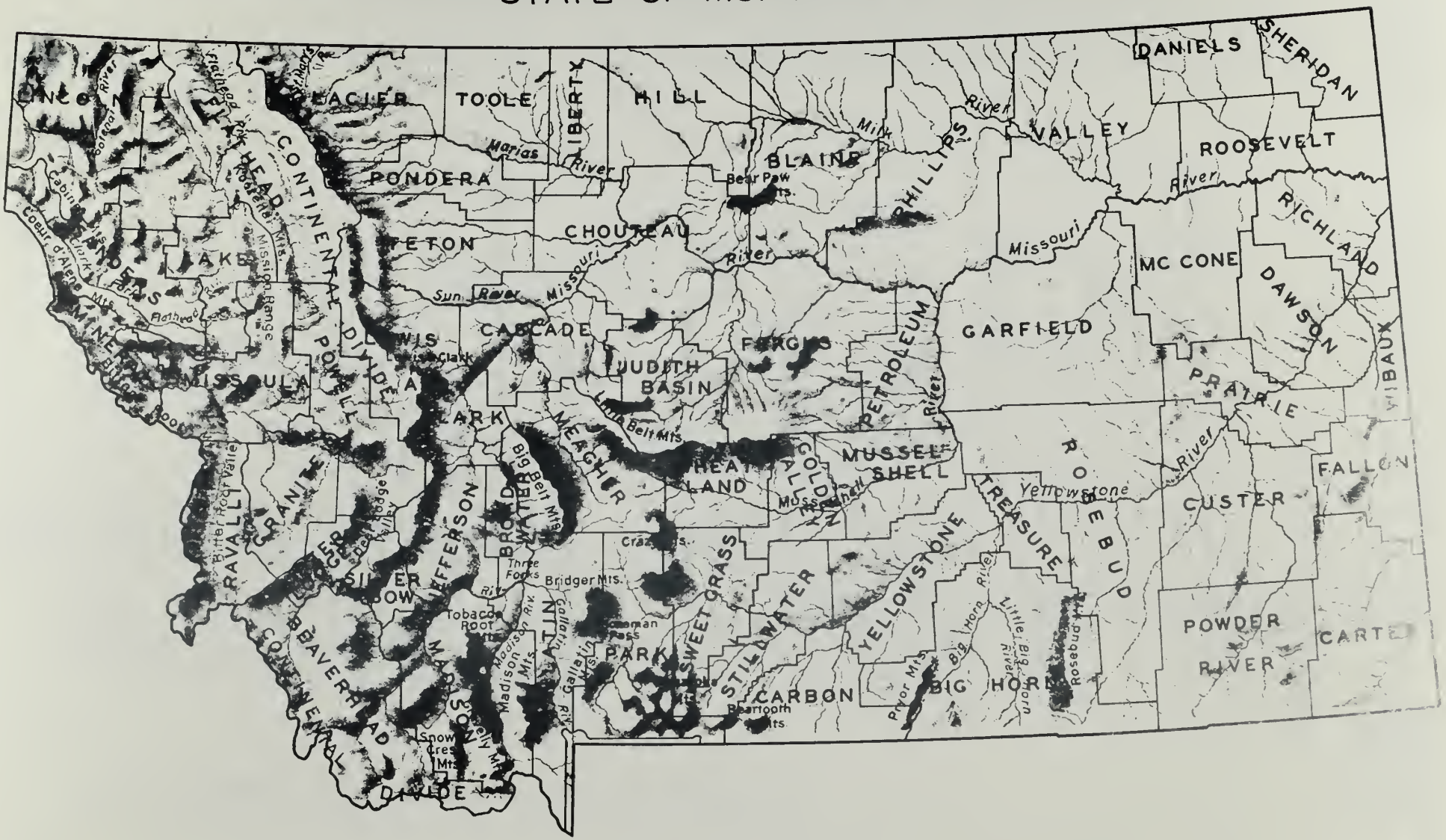
PLATE VII

Measure Of Service By System Designation And Surface Type.



Read This - Approximately 37% of all rural residents in Montana live within 2 Miles of the Federal Aid System by travel distance.

STATE OF MONTANA



2.09--Excessive Curvature on the Federal Aid System

For purposes of discussion under this heading, the state has been divided into two districts, non-mountainous in eastern Montana and mountainous in the western district. By counties and Federal Aid Routes the districts are classified as follows:

Mountainous (Improved Roads)	Miles
Flathead - Routes 1, 5, 36 and 38	185.0
Lake - Routes 5, 6 and 36	85.8
Lincoln - Routes 1, 5, 33 and 34	131.4
Glacier - Route 1, Glacier Park Station West	11.4
Route 39, Chief Mountain Highway	14.3
Cascade - Route 3, Great Falls-Helena	40.4
Route 41, US 87-89 By-Pass	2.0
Route 11, Armington South	42.0
Broadwater - Routes 2, 8 and 14	80.0
Jefferson - Routes 2, 3, 8, 13 and 29	105.6
Lewis & Clark - Routes 3 and 24	88.6
Route 9, Augusta South	41.4
Granite - Routes 2, 19 and 35	82.6
Mineral - Route 2	79.1
Missoula - Routes 2, 5, 7 and 24	98.6
Powell - Routes 2, 8 and 24	61.9
Ravalli - Routes 7 and 35	91.2
Sanders - Routes 6, 34 and 36	121.1
Beaverhead - Route 3	85.9
Deer Lodge - Routes 2, 19 and 35	42.4
Madison - Routes 3, 13 and 29	119.4
Silver Bow - Routes 2, 3 and 29	59.6
Gallatin - Routes 2, 12 and 13	79.0
Meagher - Routes 11 and 14	95.0
Park - Route 2, Livingston West	11.2
Route 11	96.8
Sub-Total	1,951.7

Non-Mountainous (Improved Roads)	
Blaine - Route 1	54.1
Glacier - Route 1, Glacier Park Station East	65.5
Route 3	61.2
Hill - Routes 1 and 10	80.9
Liberty - Route 1	24.7
Toole - Routes 1 and 21	86.7
Daniels - Routes 22, 31 and 32	46.9
Phillips - Routes 1 and 16	53.5
Roosevelt - Routes 1, 22, 25 and 32	145.5
Sheridan - Routes 22 and 30	62.5
Valley - Routes 1 and 42	97.7
Dawson - Routes 15, 17 and 20	104.2
McCone - Routes 15, 25 and 43	56.9
Prairie - Route 17	28.4
Richland - Routes 20, 22, 26	55.7
Wibaix - Route 15	13.2
Fergus - Routes 15, 16 and 43	115.0
Garfield - Routes 15 and 18	135.5
Petroleum - Routes 15 and 16	40.1
Cascade - Route 3, Great Falls-Chouteau	31.3
Route 10	16.3
Route 11 - Great Falls-Armington	21.7
Route 15 - Armington-Lewistown	7.3
Routes 21, 24 and 40	30.5

Choteau - Route 10	71.3
Judith Basin - Route 15	57.4
Pondera - Routes 3 and 21	52.2
Teton - Routes 3, 9 and 21	91.5
Lewis & Clark - Route 9, Augusta North	4.6
Park - Route 2, Livingston East	18.7
Sweet Grass - Route 2	36.4
Wheatland - Route 14	44.4
Big Horn - Route 16 and 37	86.6
Carbon - Routes 4 and 28	89.0
Golden Valley - Route 14	28.1
Musselshell - Routes 14 and 16	96.7
Stillwater - Route 2	38.1
Treasure - Route 2	28.7
Yellowstone - Routes 2, 4 and 16	128.7
Carter - Routes 23 and 27	50.0
Custer - Routes 2, 17, 18 and 23	160.5
Fallon - Routes 2 and 27	67.3
Powder River - Routes 23 and 37	71.5
Rosebud - Routes 2, 14, 18 and 37	71.7
Sub-Total	2,728.7
Grand Total Mountainous and Non-mountainous	4,680.4

The routes classified by districts, mountainous and non-mountainous are as follows:

Route No.	Mountainous	Non-mountainous	Total
1	194.3	465.5	659.8
2	337.6	351.8	689.4
3	274.4	162.1	436.5
4		53.0	53.0
5	176.0		176.0
6	115.8		115.8
7	91.1		91.1
8	104.0		104.0
9	41.4	25.4	66.8
10		111.0	111.0
11	198.7	21.7	220.4
12	9.8		9.8
13	106.4		106.4
14	57.7	135.8	193.5
15		337.0	337.0
16		195.4	195.4
17		75.2	75.2
18		82.8	82.8
19	63.2		63.2
20		61.9	61.9
21		108.3	108.3
22		98.8	98.8
23		135.5	135.5
24	24.3	17.3	41.6
25		43.2	43.2
26		7.6	7.6
27		36.9	36.9
28		39.3	39.3
29	40.4		40.4

30		10.1	10.1
31		13.8	13.8
32		50.8	50.8
33	41.9		41.9
34	Non-Existent	Non-Existent	
35	36.4		36.4
36	17.1		17.1
37		32.3	32.3
38	4.9		4.9
39	14.3		14.3
40		1.4	1.4
41	2.0		2.0
42		17.6	17.6
43		37.2	37.2
44	Non-Existent	Non-Existent	
TOTALS	1,951.7	2,728.7	4,680.4

It is presumed that driving speeds are somewhat restrained in the mountainous areas of the state by reason of increased curvature in alignment as a consequence of restricting topography. Accepting the presumption, we may say that the average speed in western Montana is lower than that in the eastern part of the state, hence a curve of short radius in the western section would have no greater effect on the normal speed than would a curve of longer radius in the eastern district. For this reason a 14° curve is considered critical in western Montana and a 6° curve presents comparable restraint in eastern Montana. Table 28 as follows presents information with respect to excess curvature along improved sections of the Federal Aid System.

Table 28

EXCESSIVE CURVATURE FEDERAL AID SYSTEM

Counties and Districts	Non-mountainous 6° and Over					Mountainous 14° and Over				
	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.
Flathead										
High Type Bituminous						68.6	36	52	2.0	2.9
Low Type Bituminous						87.3	21	24	1.4	1.6
Plain Macadam						21.8	111	509	3.6	16.5
Plain Gravel						3.2				
Graded & Drained						4.1				
All Types						185.0	168	91	7.0	3.8
Lake										
Concrete						0.5				
High Type Bituminous						54.6	1	2	0.1	0.2
Low Type Bituminous						24.1	3	12	0.2	0.8
Oreded & Drained						6.6				
All Types						85.8	4	5	0.3	0.4
Lincoln										
High Type Bituminous						2.7				
Low Type Bituminous						30.2				
Plain Macadam						38.8	10	26	0.9	2.3
Plain Gravel						28.0	57	204	1.7	6.1
Graded & Drained						31.7	16	50	0.8	2.5
All Types						131.4	83	63	3.4	2.6
Sub-Total District #1										
Concrete						0.5				
High Type Bituminous						125.9	37	29	2.1	1.7
Low Type Bituminous						141.6	24	17	1.6	1.1
Plain Macadam						60.6	121	200	4.5	7.4
Plain Grevel						31.2	57	183	1.7	5.5
Graded & Dreined						42.4	16	38	0.8	1.9
All Types						402.2	255	63	10.7	2.7
Blaine										
High Type Bituminous	18.6	9	48	0.3	1.6					
Low Type Bituminous	32.1									
Plain Grevel	3.4									
All Types	54.1	9	17	0.3	0.6					
Glacier										
High Type Bituminous	15.3	8	52	0.7	4.6	11.4	2	18	0.1	0.9
Low Type Bituminous	111.4	281	252	15.6	14.0					
Plain Macadam						14.3				
All Types	126.7	289	228	16.3	12.9	25.7	2	8	0.1	0.4
Hill										
High Type Bituminous	22.4	19	85	0.9	4.0					
Low Type Bituminous	58.5	3	5	0.2	0.3					
All Types	80.9	22	27	1.1	1.4					
Liberty										
High Type Bituminous	11.0									
Low Type Bituminous	13.7									
All Types	24.7									
Toole										
High Type Bituminous	15.6									
Low Type Bituminous	71.1	22	31	1.7	2.4					
All Types	86.7	22	25	1.7	2.0					
Sub-Total District #2										
High Type Bituminous	82.9	36	44	1.9	2.3	11.4	2	18	0.1	0.9
Low Type Bituminous	286.8	306	106	17.5	6.1					
Plain Macadam						14.3				
Plain Grevel	3.4									
All Types	373.1	342	92	19.4	5.2	25.7	2	8	0.1	0.4
Daniels										
Low Type Bituminous	46.9	6	13	0.9	1.9					
All Types	46.9	6	13	0.9	1.9					
Phillips										
High Type Bituminous	24.7	4	16	0.5	2.0					
Low Type Bituminous	28.8	1	3	0.2	0.7					
All Types	53.5	5	9	0.7	1.3					
Roosevelt										
High Type Bituminous	0.7									
Low Type Bituminous	144.8	48	33	3.5	2.4					
All Types	145.5	48	33	3.5	2.4					
Sheridan										
High Type Bituminous	12.0									
Low Type Bituminous	40.4									
Plain Macadam	10.1									
All Types	62.5									
Valley										
High Type Bituminous	20.4									
Low Type Bituminous	77.3	20	26	1.4	1.8					
All Types	97.7	20	26	1.4	1.4					

Table 28 (Continued)

Counties and Districts	Non-mountainous 6° and Over					Mountainous 14° and Over				
	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.
Sub-Total District #3										
High Type Bituminous	57.8	4	7	0.5	0.9					
Low Type Bituminous	338.2	75	22	6.0	1.8					
Plain Macadam	10.1									
All Types	406.1	79	19	6.5	1.6					
Dawson										
Concrete	0.3									
High Type Bituminous	20.4									
Low Type Bituminous	83.5	13	16	1.3	1.6					
All Types	104.2	13	16	1.3	1.6					
McCone										
Low Type Bituminous	41.9									
Plain Macadam	15.0									
All Types	56.9									
Prairie										
Low Type Bituminous	28.4	7	25	0.9	3.2					
All Types	28.4	7	25	0.9	3.2					
Richland										
High Type Bituminous	13.8									
Low Type Bituminous	34.0	3	9	0.3	0.9					
Plain Macadam	7.9									
All Types	55.7	3	5	0.3	0.5					
Wibeux										
High Type Bituminous	10.9									
Low Type Bituminous	2.3									
All Types	13.2									
Sub-Total District #4										
Concrete	0.3									
High Type Bituminous	45.1									
Low Type Bituminous	190.1	23	12	2.5	1.3					
Plain Macadam	22.9									
All Types	258.4	23	9	2.5	1.0					
Fergus										
Concrete	1.2									
High Type Bituminous	33.0	25	76	1.9	5.8					
Low Type Bituminous	46.4	68	146	3.7	8.0					
Plain Macadam	34.4	71	206	3.2	9.3					
All Types	115.0	164	144	8.8	7.7					
Garfield										
Low Type Bituminous	60.4	1	2	0.2	0.3					
Plain Macadam	53.2	4	8	0.6	1.1					
Graded & Drained	21.9									
All Types	135.5	5	4	0.8	0.6					
Petroleum										
Low Type Bituminous	40.1	11	27	1.1	2.7					
All Types	40.1	11	27	1.1	2.7					
Sub-Total District #5										
Concrete	1.2									
High Type Bituminous	33.0	25	76	1.9	5.8					
Low Type Bituminous	146.9	80	55	5.0	3.4					
Plain Macadam	87.6	75	86	3.8	4.3					
Graded & Drained	21.9									
All Types	290.6	180	62	10.7	3.7					
Cascade										
Bituminous Macadam	2.9	2	69	0.3	10.3					
Concrete	0.1									
High Type Bituminous	2.6	4	154	0.2	7.7	42.4	4	9	0.3	0.7
Low Type Bituminous	101.5	68	67	3.8	3.7	18.5	2	11	0.1	0.5
Plain Macadam						20.6	86	418	2.8	14.1
Plain Gravel						2.9	17	586	0.7	24.1
All Types	107.1	74	69	4.3	4.0	84.4	109	129	3.9	4.6
Chouteau										
Low Type Bituminous	71.3	2	3	0.2	0.3					
All Types	71.3	2	3	0.2	0.3					
Judith Basin										
High Type Bituminous	18.7	3	16	0.4	2.1					
Low Type Bituminous	38.7	2	5	0.2	0.5					
All Types	57.4	5	9	0.6	1.0					
Ponders										
Low Type Bituminous	52.2	15	29	1.2	2.3					
All Types	52.2	15	29	1.2	2.3					

Table 2B (Continued)

Counties and Districts	Non-mountainous 6" and Over					Mountainous 11" and Over				
	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.
Teton										
High Type Bituminous	0.6									
Low Type Bituminous	90.9	49	54	3.5	3.9					
All Types	91.5	49	54	3.5	3.8					
Sub-Totel Distriot #6										
Bituminous Macadam	2.9	2	69	0.3	10.3					
Concrete	0.1									
High Type Bituminous	21.9	7	32	0.6	2.7	42.4	4	9	0.3	0.7
Low Type Bituminous	354.6	136	38	8.9	2.5	18.5	2	11	0.1	0.5
Plain Macadam						20.6	86	418	2.8	14.1
Plain Crevel						2.9	17	586	0.7	24.1
All Types	379.5	145	38	9.8	2.6	84.4	109	129	3.9	4.6
Broadwater										
High Type Bituminous						15.5				
Low Type Bituminous						64.5				
All Types						80.0				
Jefferson										
High Type Bituminous						100.1	5	5	0.3	0.3
Low Type Bituminous						5.5	1	18	0.1	1.8
All Types						105.6	6	6	0.4	0.4
Lewis & Clark										
High Type Bituminous	0.3					47.6	10	21	0.7	1.5
Low Type Bituminous	4.3					82.4	3	4	0.3	0.4
All Types	4.6					430.0	13	10	1.0	0.8
Sub-Total District #7										
High Type Bituminous	0.3					163.2	15	9	1.0	0.6
Low Type Bituminous	4.3					152.4	4	3	0.4	0.3
All Types	4.6					315.6	19	6	1.4	0.4
Cranite										
High Type Bituminous						45.0	13	29	0.6	1.3
Low Type bituminous						17.7	9	51	0.5	2.8
Plain Macadam						6.3				
Graded & Drained						13.6				
All Types						82.6	22	27	1.1	1.3
Mineral										
Concrete						0.1				
High Type Bituminous						29.2	8	27	0.7	2.4
Low Type Bituminous						49.8	42	84	1.9	3.8
All Types						79.1	50	63	2.6	3.3
Missoula										
Concrete						0.1				
High Type Bituminous						75.8	6	8	0.6	0.8
Low Type Bituminous						17.8	13	73	0.7	3.9
Plain Macadam						3.2	1	31	0.1	3.1
Graded & Drained						1.7				
All Types						98.6	20	20	1.4	1.4
Powell										
High Type Bituminous						61.9	2	3	0.2	0.3
All Types						61.9	2	3	0.2	0.3
Ravelli										
High Type Bituminous						44.2	1	2	0.1	0.2
Low Type Bituminous						6.9				
Graded & Drained						40.1	397	991	8.0	20.0
All Types						91.2	398	417	8.1	8.9
Sanders										
High Type Bituminous						28.9	3	10	0.2	0.7
Low Type Bituminous						85.9	24	28	1.3	1.5
Plain Macadam						6.4				
All Types						121.1	27	22	1.5	1.2

Table 28 (Continued)

Counties and Districts	Non-mountainous 6" and Over					Mountainous 14" and Over				
	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.
Sub-Total District #8										
Concrete						0.2				
High Type Bituminous						285.0	33	12	2.4	0.8
Low Type Bituminous						178.0	88	49	4.4	2.5
Plain Macadam						15.9	1	6	0.1	0.6
Graded & Dreined						55.4	397	717	8.0	14.4
All Types						534.5	519	97	14.9	2.8
Beaverhead										
High Type Bituminous						85.9	1	1	0.1	0.1
All Types						85.9	1	1	0.1	0.1
Deer Lodge										
Concrete						8.0				
High Type Bituminous						30.9				
Low Type Bituminous						3.5	1	29	0.1	2.9
All Types						42.4	1	2	0.1	0.2
Madison										
Concrete						0.1				
High Type Bituminous						22.7				
Low Type Bituminous						71.8				
Plain Macadam						15.9				
Plain Gravel						8.9	72	809	2.4	27.0
All Types						119.4	72	60	2.4	2.0
Silver Bow										
Concrete						14.4	5	35	0.3	2.1
High Type Bituminous						41.3	25	61	1.2	2.9
Low Type Bituminous						3.9				
All Types						59.6	30	50	1.5	2.5
Sub-Total District #9										
Concrete						22.5	5	22	0.3	1.3
High Type Bituminous						180.8	26	14	1.3	0.7
Low Type Bituminous						79.2	1	1	0.1	0.1
Plain Macadam						15.9				
Plain Gravel						8.9	72	809	2.4	27.0
All Types						307.3	104	34	4.1	1.3
Gallatin										
High Type Bituminous						49.5	15	30	0.8	1.6
Low Type Bituminous						29.5	4	14	0.3	1.0
All Types						79.0	19	24	1.1	1.4
Park										
Concrete						0.1				
High Type Bituminous	18.7	2	11	0.1	0.5	55.0	12	22	0.7	1.3
Low Type Bituminous						33.8	6	18	0.2	0.6
Plain Macedam						19.1				
All Types	18.7	2	11	0.1	0.5	108.0	18	17	0.9	0.8
Sweet Grass										
High Type Bituminous	36.4	8	22	0.5	1.4					
All Types	36.4	8	22	0.5	1.4					
Meagher										
Low Type Bituminous						63.5	10	16	0.6	0.9
Plain Macadam						4.6				
Plain Gravel						19.9	28	141	1.3	6.5
Graded & Drained						7.0				
All Types						95.0	38	40	1.9	2.0
Wheatland										
Low Type Bituminous	44.4	3	7	0.2	0.5					
All Types	44.4	3	7	0.2	0.5					
Sub-Total District #10										
Concrete						0.1				
High Type Bituminous	55.1	10	18	0.6	1.1	104.5	27	26	1.5	1.4
Low Type Bituminous	44.4	3	7	0.2	0.5	126.8	20	16	1.1	0.9
Plain Macadam						23.7				
Plain Gravel						19.9	28	141	1.3	6.5
Graded & Drained						7.0				
All Types	99.5	13	13	0.8	0.8	282.0	75	27	3.9	1.4
Big Horn										
Low Type Bituminous	78.5	13	17	1.1	1.4					
Graded & Drained	8.1									
All Types	86.6	13	15	1.1	1.3					
Carbon										
High Type Bituminous	4.2	1	24	0.1	2.4					
Low Type Bituminous	84.8	12	14	0.9	1.1					
All Types	89.0	13	15	1.0	1.3					
Golden Valley										
High Type Bituminous	16.1	1	6	0.1	0.6					
Low Type Bituminous	12.0									
All Types	28.1	1	4	0.1	0.4					

Table 26 (Continued)

Counties and Districts	Non-mountainous 6° and Over					Mountainous 4° and Over				
	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.	Total Mileage	Number	No. Per 100 Mi.	Length	Length Per 100 Mi.
Musselshell										
Low Type Bituminous	63.1	80	127	4.8	7.6					
Graded & Drained	33.6	3	9	0.3	0.9					
All Types	96.7	83	86	5.1	5.3					
Stillwater										
High Type Bituminous	38.1	16	42	1.3	3.4					
All Types	38.1	16	42	1.3	3.4					
Treasure										
High Type Bituminous	28.7	15	52	1.8	6.3					
All Types	28.7	15	52	1.8	6.3					
Yellowstone										
Concrete	0.2									
High Type Bituminous	10.3	1	10	0.1	1.0					
Low Type Bituminous	118.2	66	56	3.8	3.2					
All Types	128.7	67	52	3.9	3.1					
Sub-Total District #11										
Concrete	0.2									
High Type Bituminous	97.4	34	35	3.4	3.5					
Low Type Bituminous	356.6	171	48	10.6	3.0					
Graded & Drained	41.7	3	7	0.3	0.7					
All Types	495.9	208	42	14.3	2.9					
Carter										
Low Type Bituminous	38.4									
Plain Macadam	11.6	10	86	0.5	4.3					
All Types	50.0	10	20	0.5	1.0					
Custer										
High Type Bituminous	27.4	24	88	2.2	8.0					
Low Type Bituminous	133.1	36	27	3.2	2.4					
All Types	160.5	60	37	5.4	3.4					
Fallon										
High Type Bituminous	3.4									
Low Type Bituminous	26.9									
Plain Macadam	37.0	57	154	2.5	6.8					
All Types	67.3	57	85	2.5	3.7					
Powder River										
Low Type Bituminous	47.3	6	13	0.6	1.3					
Graded & Drained	24.2	6	25	0.8	3.3					
All Types	71.5	12	17	1.4	2.0					
Rosebud										
High Type Bituminous	25.5	14	55	1.2	4.7					
Low Type Bituminous	33.5	6	18	0.2	0.6					
Plain Macadam	12.7									
All Types	71.7	20	28	1.4	2.0					
Sub-Total District #12										
High Type Bituminous	56.3	38	68	3.4	6.0					
Low Type Bituminous	279.2	48	17	4.0	1.4					
Plain Macadam	61.3	67	109	3.0	4.9					
Graded & Drained	24.2	6	25	0.8	3.3					
All Types	421.0	159	38	11.2	2.7					
Grand Total										
Bituminous Macadam	2.9	2	69	0.3	10.3					
Concrete	1.8					23.3	5	21	0.3	1.3
High Type Bituminous	449.8	154	35	12.3	2.7	913.2	114	16	8.7	0.9
Low Type Bituminous	2,001.1	842	42	54.7	2.7	696.5	139	20	7.7	1.1
Plain Macadam	181.9	142	78	6.8	3.7	151.0	208	138	7.4	4.9
Plain Gravel	3.4					62.9	174	276	6.1	9.7
Graded & Drained	87.8	9	10	1.1	1.3	104.8	413	394	0.0	8.4
All Types	2,728.7	1,149	42	75.2	2.8	1,951.7	1,083	55	39.0	2.0

Mountainous District

Concrete - 23.3 miles

There are 5 curves in Silver Bow County exceeding the limits set for the inventory. These curves aggregate 0.3 miles in length and occur at the rate of 35 per 100 miles. There are no sections with excessive curvature in Deer Lodge County, the only other county in which there is a significant length of concrete.

High Type Bituminous - 913.2 miles

There are 16 counties in which the curvature is excessive. On the average the excessive curvature occurs at the rate of 16 per 100 miles, i.e. one curve for each 6.25 miles. Most excessive curves occur at a rate of less than 10 per 100 miles. Half the curves occur at a rate of less than 19 per 199 miles. High degrees of occurrence are in Flathead County on US2 from Belton east, and in Silver Bow County on US10, F.A.P.159.

Low Type Bituminous - 696.5 miles

There are 13 counties in which there are curves of excessively high degree. Over the mountainous district, excessive curvature occurs at the rate of 20 per 100 miles, or one curve for each 5 miles. Most excessive curvature occurs at a rate of 10 to 19 curves per 100 miles. Half the curves occur at a rate of less than 18 per 100 miles. High frequencies occur in Mineral County on US10, vicinity of the Idaho line, in Missoula County, vicinity of the Mineral County line, and Granite County, $US10_S$, vicinity of the Deer Lodge County line.

Plain Macadam - 151.0 miles

Excessive curvature occurs in four counties at an average rate of 138 per 100 miles. In two counties, Lincoln and Missoula, the frequency is 26 and 31 respectively per 100 miles. In Flathead and Cascade counties excessive curvature occurs at the rate of 509 and 418 respectively per 100 miles. The situs of incidence is principally on US2 in Flathead County, F.H.P. 13 east of Belton, and in Cascade County most excessive curvature occurs on US89, F.H.P. 32, from Armington to Neihart.

Plain Gravel - 62.9 miles

There are four occurences of excessive curvature in the western district, the situs thereof being:

Meagher, Montana 6, White Sulphur Springs east at a rate of 141 excessive curves per 100 miles

Lincoln, Montana 37, vicinity of Stonehill and Ural, at a rate of 204 per 100 miles.

Cascade, US89 south of Armington, occuring at a rate of 586 per 100 miles.

Madison, Montana 41, Virginia City east, at a rate of 809 per 100 miles.

Graded & Drained - 104.8 miles

Two occurrences, one in Lincoln County, US2, vicinity of Flathead County line, at a rate of 50 curves per 100 miles and one in Ravalli County, Montana 38 the Skalkaho Highway, at a rate of 991 excess curves per 100 miles.

Composite - 1,951.7 miles

By grouping the data, it is found that there are 360.8 miles of roadway on which there is no excessive curvature. On approximately half the remaining mileage excess curvature occurs at a rate of less than 20 per 100 miles, or one curve of excessive high degree per each 5 miles traversed. Presuming this frequency rate to be critical, we find intervals of excessive curvature as set forth hereafter.

Table 29

LOCATION OF EXCESSIVE CURVATURE ON FEDERAL AID SYSTEM IN MOUNTAINOUS DISTRICT

Excessive Curvature - In excess of 14° and occurring at the rate of ten or more per 5 miles.

Projects marked thus, FH, are National Forest Highways.

County	F. A. Route No.	Project Number	Surface Type: Concrete Mi.	Concrete Curve Length	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Curve Length	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Curve Length	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Curve Length	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Curve Length	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Curve Length	Graded & Drained Tr.	All Types Mi.	All Types Curve Length	All Types Tr.
Flathead	1	58A							3.9	0.6	112										3.9	0.6	112
		58D							7.0	0.2	173										7.0	0.2	173
		FH-13C-J				27.4	1.7	104				16.5	3.6	123							43.9	5.3	111
						27.4	1.7	104	10.9	0.8	151	16.5	3.6	123							54.8	6.1	119
	5	FH-12A-B							11.3	0.2	97										11.3	0.2	97
		191D				2.7	0.3	400													2.7	0.3	400
						2.7	0.3	400	11.3	0.2	97										14.0	0.5	155
Lake	5	93							3.2	0.1	620										3.2	0.1	620
Lincoln	1	FH-1A										5.0	0.2	90							5.0	0.2	90
		58C																7.6	0.8	50	7.6	0.8	50
												5.0	0.2	90				7.6	0.8	50	12.6	1.0	66
	33	137													3.0	0.3	55				3.0	0.3	55
		145A													7.4	0.5	51				7.4	0.5	51
		FH-57A										10.3	0.2	52							10.3	0.2	52
		145D													9.1	0.9	56				9.1	0.9	56
		118A													1.7	0.1	58				1.7	0.1	58
												10.3	0.2	52	21.2	1.8	54				31.5	2.0	53
Dist. #1						30.1	2.0	131	25.4	1.1	186	31.8	4.0	95	21.2	1.8	54	7.6	0.8	50	116.1	6.7	116
Glacier	1	260				6.0	0.1	101													6.0	0.1	101
Dist. #2						6.0	0.1	101													6.0	0.1	101
Cascade	11	FH-32E-D-A										20.6	2.8	103	2.9	0.7	126				23.5	3.5	106
Dist. #6												20.6	2.8	103	2.9	0.7	126				23.5	3.5	106
Jefferson	2	69B				4.6	0.1	742													4.6	0.1	742
	3	178A							4.6	0.1	785										4.6	0.1	785
		212A				10.0	0.1	622													10.0	0.1	622
						10.0	0.1	622	4.6	0.1	785										14.6	0.2	673
Lewis & Clark	3	172A				5.3	0.2	453													5.3	0.2	453
		269A				10.1	0.9	481													10.1	0.9	481
						15.4	1.1	472													15.4	1.1	472
	8	FH-28-B				4.9	0.4	508													4.9	0.4	508
	9	238C & E							9.2	0.3	83										9.2	0.3	83
Dist. #7						30.3	1.7	527	13.8	0.4	317										44.1	2.1	461
Granite	19	205B & C				8.6	0.1	223													8.6	0.1	223
		78A				10.1	0.5	255													10.1	0.5	255
		FH 17							3.1	0.5	301										3.1	0.5	301
						18.7	0.6	240	3.1	0.5	301										21.8	1.1	249
Mineral	2	FH 8B							2.6	0.9	570										2.6	0.9	570
		183A & B							5.3	0.4	562										5.3	0.4	562
		FH 8G							4.7	0.3	553										4.7	0.3	553
		FH $8S_1$				3.0	0.2	550													3.0	0.2	550
		FH 8K & C				7.6	0.5	514	0.2	0.1	516										7.8	0.6	514
		254A							3.9	0.1	590										3.9	0.1	590
		FH 8C & E							7.6	0.1	509										7.6	0.1	509
						10.6	0.7	526	24.5	1.9	549										35.1	2.6	542
Missoula	2	FH 6D							3.3	0.7	462										3.3	0.7	462
		231C				3.0	0.1	1737													3.0	0.1	1737
		131A-E				18.3	0.4	807													18.3	0.4	307
						21.3	0.5	939	3.3	0.7	462										24.6	1.2	875
	5	219A							2.8	0.1	613										2.8	0.1	613
	24											3.2	0.1	100							3.2	0.1	100
Powell	8	FH 28B				4.2	0.1	468													4.2	0.1	468
Revelli	7	174				1.5	0.1	337													1.5	0.1	337
		FH 19A & B																7.5	1.1	51	7.5	1.1	51
						1.5	0.1	337										7.5	1.1	51	9.0	1.2	99
	35	161A																16.5	6.9	54	16.5	6.9	54
Sanders	6	FH 6F & E							5.5	0.2	107										5.5	0.2	107
		FH 6B & C							9.8	0.3	130										9.8	0.3	130
		FH 6D							4.4	0.1	153										4.4	0.1	153
		223B				5.8	0.2	365													5.8	0.2	365
		186							14.0	0.6	237										14.0	0.6	237
		88							5.1	0.1	305										5.1	0.1	305
						5.8	0.2	365	38.8	1.3	191										44.6	1.5	214
Dist. #8						62.1	2.2	523	72.5	4.5	345	3.2	0.1	100				24.0	8.0	53	161.8	14.8	366
Beaverhead	3	241A				9.9	0.1	364													9.9	0.1	364
Deer Lodge	19	FH 17A							3.5	0.1	298										3.5	0.1	298
Madison	29	9B													8.9	2.4	106				8.9	2.4	106
Silver Bow	2	207B	3.7	0.1	1011	2.2	0.1	694													5.9	0.2	967
		159				2.3	0.6	823													2.3	0.6	823
			3.7	0.1	1011	4.5	0.7	858													8.2	0.8	927
Dist. #9			3.7	0.1	1011	14.4	0.8	528	3.5	0.1	298				8.9	2.4	106				30.5	3.4	437
Gallatin	2	222				8.6	0.2	911													8.6	0.2	911
		166				3.9	0.6	778													3.9	0.6	778
						12.5	0.8	870													12.5	0.8	670
	12	FH 46A							9.8	0.1	266										9.8	0.1	266
	13	FH 45B							1.8	0.2	117										1.8	0.2	117
Meagher	11	FH 32F & C							7.5	0.5	73										[illegible]	0.5	73
		94A-B													14.5	1.0	73				14.5	1.0	73
		8A													1.3	0.1	165				1.3	0.1	165
									7.5	0.5	73				15.8	1.1	82				23.3	1.6	79
	14	8A													0.6	0.1	111				0.6	0.1	111
Park	2	166				0.3	0.1	700													0.3	0.1	700
	11	60A							5.4	0.2	246										5.4	0.2	246
		14				4.2	0.1	748													4.2	0.1	748
		105				6.9	0.3	501													6.9	0.3	501
		59A & B				2.8	0.0	486													2.8	0.0	486
		217D & G				5.0	0.2	341													5.0	0.2	341
						18.9	0.6	311	5.4	0.2	246										24.3	0.8	432
Dist. #10						31.7	1.5	655	24.5	1.0	192				10.4	1.3	76				72.6	3.8	363
Mountainous District			3.7	0.1	1011	174.6	8.3	460	139.7	7.1	265	[illegible]	[illegible]	[illegible]	40.4	6.1	[illegible]	31.6	8.8	52	[illegible]	[illegible]	299
Total Lengths & Averages			23.3	0.3	1536	913.2	8.7	489	696.5	7.7	279	1[illegible]1.0	7.4	100	62.9	6.1	96	104.8	8.8	59	1091.[illegible]	59.0	340

On review of the tabulations, we find res rictions as follows:

Concrete - Approximately 16% of the total concrete mileage bears excessive curvature traffic,volumes are about 34% less than average along the interval affected.

High Type Bituminous - Approximately 19% of this mileage is restricted, the traffic volumes being about 5% less than the average along the intervals affected.

Low Type Bituminous - Approximately 20% of this mileage is restricted, the traffic volumes being about 2% greater than the average for the district.

Plain Macadam - Approximately 37% of this mileage is restricted, the traffic volumes being about 2% less than the average along the intervals affected.

Plain Gravel - Approximately 79% of this mileage is restricted, the traffic volumes being about 22% less than the average along the intervals affected.

Graded & Drained - Approximately 30% of this mileage is restricted, the traffic volumes being about 12% less than the average along the intervals affected.

All Types - Approximately 23% of the total mileage is restricted, the traffic volumes being about 17% less than the average. Of the total mileage bearing excessive curvature, the National Forest Highway System furnishes about 41% of the total mileage. In terms of actual curve lengths the Forest System furnishes 42% of the total.

In the non-mountainous areas we find similar relationships existing as regards surface types. Of the total mileage in the eastern district, there are 376.7 miles which are unrestricted with respect to excessive curvature. Of the remainder, one-half bears curvature at a rate of less than 30 curves per 100 miles. Again presuming this frequency, as determined by the median, to be critical we find significant intervals of excessive curvature in the non-mountainous area as follows:

Table 30

LOCATION OF EXCESSIVE CURVATURE ON FEDERAL AID SYSTEM IN NON-MOUNTAINOUS DISTRICT

Excessive Curvature-In excess of 6° and occurring at a rate of one or more per 3 1/3 miles.

County	F. A. Route No.	Project Number	Surface Type: Bituminous Macadam			High Type Bituminous			Low Type Bituminous			Plain Macadam			Plain Gravel			Graded & Drained			All Types		
			Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.	Mi.	Curve Length	Tr.
Blaine	1	66				5.7	0.3	650	6.9	0.2	576										12.6	0.5	609
		23							4.2	0.1	659										4.2	0.1	659
		SA 5							5.5	0.1	545										5.5	0.1	545
						5.7	0.3	650	16.6	0.4	587										22.3	0.7	603
Glacier	1	226							11.9	3.6	138										11.9	3.6	138
		196B				13.0	0.7	405													13.0	0.7	405
						13.0	0.7	405	11.9	3.6	138										24.9	4.3	277
	3	227B							8.4	1.4	273										8.4	1.4	273
		210							6.1	2.8	142										6.1	2.8	142
		227A							14.2	4.9	130										14.2	4.9	130
		190							21.9	2.6	137										21.9	2.6	137
									50.6	11.7	157										50.6	11.7	157
Bill	1	95B				5.0	0.4	420	4.6	0.1	337										9.6	0.5	381
		95A				8.1	0.9	651													8.1	0.9	651
						13.1	1.3	563	4.6	0.1	337										17.7	1.4	505
Toole	1	154A							6.5	0.1	462										6.5	0.1	462
	21	67A							9.5	1.2	327										9.5	1.2	327
Dist. #2						31.8	2.3	514	99.7	17.1	274										131.5	19.4	332
Daniels	5	251A							3.6	0.6	228										3.6	0.6	228
Phillips	1	153A				3.5	0.1	463													3.5	0.1	463
Roosevelt	1	84A							9.6	0.3	407										9.6	0.3	407
		84D							6.8	0.2	384										6.8	0.2	384
		84E							0.8	0.3	533										0.8	0.3	533
		84F							3.5	0.6	281										3.5	0.6	281
		84I							10.6	0.5	245										10.6	0.5	245
		240B							1.9	0.2	264										1.9	0.2	264
		84G							3.4	0.3	275										3.4	0.3	275
									36.6	2.4	327										36.6	2.4	327
	22	193A							7.3	0.5	278										7.3	0.5	278
		273A							2.4	0.2	101										2.4	0.2	101
									9.7	0.7	234										9.7	0.7	234
Valley	1	189							15.8	0.4	499										15.8	0.4	499
		232							9.5	0.5	581										9.5	0.5	581
									25.3	0.9	530										25.3	0.9	530
Dist. #3						3.5	0.1	463	75.2	4.6	379										78.7	4.7	383
Dawson	17	130A							15.7	0.5	225										15.7	0.5	225
		7							7.0	0.5	315										7.0	0.5	315
									22.7	1.0	253										22.7	1.0	253
Prairie	17	130D							0.3	0.1	380										0.3	0.1	380
		130E							0.3	0.2	362										0.3	0.2	362
		130B							5.4	0.3	283										5.4	0.3	283
									6.0	0.6	292										6.0	0.6	292
Richland	20	245E							3.1	0.2	259										3.1	0.2	259
		245B							2.7	0.1	228										2.7	0.1	228
									5.8	0.3	245										5.8	0.3	245
Dist. #4									34.5	1.9	259										34.5	1.9	259
Fergus	15	235C				6.5	0.2	408													6.5	0.2	408
		235B				8.3	0.5	506													8.3	0.5	506
		229A				3.9	0.4	359													3.9	0.4	359
		229B				6.0	0.8	324													6.0	0.8	324
						24.7	1.9	413													24.7	1.9	413
	16	26B							0.9	0.2	277										0.9	0.2	277
		26A							6.0	1.3	181										6.0	1.3	181
		27							10.8	1.0	173										10.8	1.0	173
									17.7	2.5	181										17.7	2.5	181
	43	103B							14.2	1.6	309										14.2	1.6	309
		103C										21.8	3.1	84							21.8	3.1	84
									14.2	1.6	309	21.8	3.1	84							36.0	4.7	173
Garfield	15	256H							1.2	0.2	188										1.2	0.2	188
Petroleum	15	256B							0.5	0.4	92										0.5	0.4	92
	16	28							4.9	0.4	174										4.9	0.4	174
Dist. #5						24.7	1.9	413	38.5	5.1	226	21.8	3.1	84							85.0	10.1	244
Cascade	3	65B							13.6	0.7	333										13.6	0.7	333
		10							17.7	0.5	860										17.7	0.5	860
									31.3	1.2	632										31.3	1.2	632
	10	149A				0.2	0.1	690	1.1	0.1	649										1.3	0.2	655
	11	180	2.9	0.3	614																2.9	0.3	614
		64A							16.6	0.9	623										16.6	0.9	623
		64C				0.7	0.1	607													0.7	0.1	607
		64B							1.4	0.2	600										1.4	0.2	600
			2.9	0.3	614	0.7	0.1	607	18.0	1.1	621										21.6	1.5	620
	15	235D							7.3	0.5	256										7.3	0.5	256
	21	211A							10.4	0.9	427										10.4	0.9	427
Chouteau	10	252F							0.7	0.1	535										0.7	0.1	535
Pondera	3	190							3.8	0.1	111										3.8	0.1	111
		236A							11.4	0.4	125										11.4	0.4	125
		236B							5.6	0.5	140										5.6	0.5	140
									20.8	1.0	127										20.8	1.0	127
Teton	3	151							13.2	1.4	147										13.2	1.4	147
		136							13.3	0.4	240										13.3	0.4	240
		65A							21.9	1.2	296										21.9	1.2	296
									48.4	3.0	240										48.4	3.0	240
Dist. #6			2.9	0.3	614	0.9	0.2	625	138.0	7.9	381										141.8	8.4	368
Sweet Grass	2	127A				5.3	0.4	643													5.3	0.4	643
		127B				2.1	0.1	582													2.1	0.1	582
						7.4	0.5	626													7.4	0.5	626
Wheatland	14	115E							1.0	0.1	256										1.0	0.1	256
		115B							6.4	0.1	196										6.4	0.1	196
									7.4	0.2	204										7.4	0.2	204
Dist. #10						7.4	0.5	626	7.4	0.2	204										14.8	0.7	415
Big Horn	16	186A							1.5	0.1	957										1.5	0.1	957
		212I							9.1	0.2	334										9.1	0.2	334
		212J							3.6	0.7	271										3.6	0.7	271
									14.2	1.0	386										14.2	1.0	386
Carbon	4	107D							0.7	0.1	706										0.7	0.1	706
		107A							6.0	0.3	612										6.0	0.3	612
		256B							12.7	0.4	361										12.7	0.4	361
									19.4	0.8	464										19.4	0.8	464
	28	106B							5.5	0.1	429										5.5	0.1	429
Musselshell	14	33							1.0	0.2	1179										1.0	0.2	1179

Table 30 (Continued)

County	F. A. Route No.	Project Number	Surface Type: Bituminous Macadam Mi.	Bituminous Macadam Curve Length	Bituminous Macadam Tr.	High Type Bituminous Mi.	High Type Bituminous Curve Length	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Curve Length	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Curve Length	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Curve Length	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Curve Length	Graded & Drained Tr.	All Types Mi.	All Types Curve Length	All Types Tr.
	16	138B							3.0	0.4	289										3.0	0.4	289
		33							3.2	0.4	953										3.2	0.4	953
		108A							11.5	1.9	325										11.5	1.9	325
		108B							6.5	1.8	320										6.5	1.8	320
									24.2	4.5	402										24.2	4.5	402
Stillwater	2	123A				8.4	0.2	599													8.4	0.2	599
		123B				8.3	0.2	613													8.3	0.2	613
		109				4.7	0.6	607													4.7	0.6	607
		170C				8.7	0.3	645													8.7	0.3	645
						30.1	1.3	619													30.1	1.3	619
Treasure	2	160D				17.7	1.8	398													17.7	1.8	398
Yellow-stone	2	228A							0.2	0.1	2382										0.2	0.1	2382
		230A							1.3	0.2	2205										1.3	0.2	2205
		53A							13.0	0.3	1080										13.0	0.3	1080
		53A							9.5	0.2	774										9.5	0.2	774
		53B							11.8	0.5	504										11.8	0.5	504
		160A							5.9	0.2	443										5.9	0.2	443
		160B							2.3	0.7	438										2.3	0.7	438
									44.0	2.2	779										44.0	2.2	779
	4	134							3.3	0.1	926										3.3	0.1	926
	16	187C							5.4	0.5	418										5.4	0.5	418
		187A							14.1	1.9	364										14.1	1.9	364
									19.5	2.4	379										19.5	2.4	379
Dist. #11						47.8	3.1	536	131.1	11.3	552										178.9	14.4	548
Carter	27											11.6	0.5	104							11.6	0.5	104
Custer	2	135B				3.8	0.8	405													3.8	0.8	405
		135D				10.6	1.3	455													10.6	1.3	455
						14.4	2.1	442													14.4	2.1	442
	17	156B							16.6	2.2	347										16.6	2.2	347
	18	157A							4.5	0.2	104										4.5	0.2	104
Fallon	2	66B										11.7	0.6	167							11.7	0.6	167
	27	48A										25.3	1.9	130							25.3	1.9	130
Powder River	23	198B							8.4	0.4	98										8.4	0.4	98
		198A							6.4	0.2	133										6.4	0.2	133
									14.8	0.6	113										14.8	0.6	113
	37	FH 53A																5.2	0.8	15	5.2	0.8	15
Rosebud	2	15							4.3	0.1	500										4.3	0.1	500
		135A				6.2	0.3	489													6.2	0.3	489
		135C				13.2	0.8	445													13.2	0.8	445
		135B				6.1	0.1	436													6.1	0.1	436
						25.5	1.2	453	4.3	0.1	500										29.8	1.3	459
Dist. #12						39.9	3.3	449	40.2	3.1	250	48.6	3.0	133				5.2	0.8	15	133.9	10.2	258
Non-mountainous District			2.9	0.3	614	156.0	11.4	493	564.6	51.2	372	70.4	6.1	118				5.2	0.8	15	799.1	69.8	372

Review of the tabulation discloses the incidence of excessive curvature in the counties bordering on the mountainous district and along the two principal through highways, US2 and US10. Since the roads in these counties and the two principal routes tap the centers of population, we have a contradictory condition in the area wherein the greatest traffic volumes are restricted to a greater degree than are the lesser volumes. Details with respect to the restrictions are as follows:

Concrete - 1.8 miles
There are no restrictions on these intervals.

Bituminous Macadam - 2.9 miles
One occurrence and consequently no change in averages set forth herebefore in section 2.033.

High Type Bituminous - 449.8 miles
Approximately 35% or 156 miles of the total is restricted, the traffic volumes being about 6% less.

Low Type Bituminous - 2,001.1 miles
Approximately 28% or 564.6 miles of the total length is restricted mileage, the traffic volume in this case being about 22% in excess of the average for the district for the reasons given heretofore.

Plain Macadam - 181.9 miles
Approximately 69% of the total mileage is restricted, the traffic volume being 20% in excess of the average for the district.

Plain Gravel - 3.4 miles
No restrictions on this mileage.

Graded & Drained - 87.8 miles
Approximately 6% of the total mileage is restricted, the traffic volume being about 66% less.

All Types - 2,728.7 miles
Approximately 29% or 799.1 miles of the total is restricted, the traffic volume being 16% in excess of the average for the district. On the premise we may then say that there is a significant mileage now serving the higher traffic volumes which warrants improvement.

2.10 Restricted Sights on The Federal Aid System

Restricted sights occur on the Federal Aid System as shown by the following tables. The degree of restriction depends on a predetermined safe minimum sight distance which in this case is 1,000 feet in the non-mountainous area and 650 feet in the mountainous area.

Table 31

RESTRICTED SIGHTS — FEDERAL AID SYSTEM

Counties and Districts	Non-mountainous							Mountainous						
	Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total		Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total	
		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.
Flathead														
High Type Bit.								68.6	38	55	121	177	159	232
Low Type Bit.								87.3	19	22	131	150	150	172
Plain Macadam								21.8	69	316	28	128	97	444
Plain Gravel								3.2	1	31	8	250	9	281
Graded & Drained								4.1						
All Types								185.0	127	69	288	155	415	224
Lake														
Concrete								0.5						
High Type Bit.								54.6	5	9	88	161	93	170
Low Type Bit.								24.1	8	33	44	182	52	215
Graded & Drained								6.6			3	45	3	45
All Types								85.8	13	15	135	157	148	172
Lincoln														
High Type Bit.								2.7						
Low Type Bit.								30.2	11	36	50	166	61	202
Plain Macadam								38.8	15	39	49	126	64	165
Plain Gravel								28.0	46	164	64	228	110	392
Graded & Drained								31.7	11	35	26	82	37	117
All Types								131.4	83	63	189	144	272	207
Sub-Total Dist. #1														
Concrete								0.5						
High Type Bit.								125.9	43	34	209	166	252	200
Low Type Bit.								141.6	38	27	225	159	263	186
Plain Macadam								60.6	84	139	77	127	161	266
Plain Gravel								31.2	47	151	72	231	119	382
Graded & Drained								42.4	11	26	29	68	40	94
All Types								402.2	223	55	612	152	835	207
Blaine														
High Type Bit.	18.6	6	32	2	11	8	43							
Low Type Bit.	32.1													
Plain Gravel	3.4													
All Types	54.1	6	11	2	4	8	15							
Glacier														
High Type Bit.	15.3	3	20	26	170	29	190	11.4	4	35	15	132	19	167
Low Type Bit.	111.4	157	141	177	159	334	300							
Plain Macadam								14.3	1	7	33	231	34	238
All Types	126.7	160	126	203	160	363	286	25.7	5	19	48	187	53	206
Hill														
High Type Bit.	22.4	15	67	16	71	31	138							
Low Type Bit.	58.5	3	5	27	46	30	51							
All Types	80.9	18	22	43	53	61	75							
Liberty														
High Type Bit.	11.0													
Low Type Bit.	13.7	1	7	8	58	9	65							
All Types	24.7	1	4	8	32	9	36							
Toole														
High Type Bit.	15.6													
Low Type Bit.	71.1	25	35	74	104	99	139							
All Types	86.7	25	29	74	85	99	114							
Sub-Total Dist. #2														
High Type Bit.	82.9	24	29	44	53	68	82	11.4	4	35	15	132	19	167
Low Type Bit.	286.8	186	65	286	100	472	165							
Plain Macadam								14.3	1	7	33	231	34	238
Plain Gravel	3.4													
All Types	373.1	210	57	330	88	540	145	25.7	5	19	48	187	53	206
Daniels														
Low Type Bit.	46.9	18	38	63	134	81	172							
All Types	46.9	18	38	63	134	81	172							
Phillips														
High Type Bit.	24.7	7	28	12	49	19	77							
Low Type Bit.	28.8	4	14	18	62	22	76							
All Types	53.5	11	21	30	56	41	77							
Roosevelt														
High Type Bit.	0.7													
Low Type Bit.	144.8	72	50	108	75	180	125							
All Types	145.5	72	49	108	74	180	123							
Sheridan														
High Type Bit.	12.0	3	25	5	42	8	67							
Low Type Bit.	40.4	17	42	32	79	49	121							
Plain Macadam	10.1													
All Types	62.5	20	32	37	59	57	91							
Valley														
High Type Bit.	20.4	2	10	16	78	18	88							
Low Type Bit.	77.3	22	28	30	39	52	67							
All Types	97.7	24	25	46	47	70	72							
Sub-Total Dist. #3														
High Type Bit.	57.8	12	21	33	57	45	78							
Low Type Bit.	338.2	133	39	251	74	384	113							
Plain Macadam	10.1													
All Types	406.1	145	36	284	70	429	106							
Dawson														
Concrete	0.3													
High Type Bit.	20.4			37	181	37	181							
Low Type Bit.	83.5	26	31	90	108	116	139							
All Types	104.2	26	25	127	122	153	147							

Table 31 (Contioued)

Counties and Districts	Non-mountainous						Mountainous					
	Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total	Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total
		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No. No. Per 100 Mi.		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No. No. Per 100 Mi.
McCone												
Low Type Bit.	41.9	13	31	45	107	58 138						
Plain Macedam	15.0			6	40	6 40						
All Types	56.9	13	23	51	90	64 113						
Prairie												
Low Type Bit.	28.4	9	32	18	63	27 95						
All Types	28.4	9	32	18	63	27 95						
Richland												
High Type Bit.	13.8	2	14	7	51	9 65						
Low Type Bit.	34.0	14	41	19	56	33 97						
Plain Macedam	7.9			1	13	1 13						
All Types	55.7	16	29	27	48	43 77						
Wibeux												
High Type Bit.	10.9	2	18	16	147	18 165						
Low Type Bit.	2.3			1	44	1 44						
All Types	13.2	2	15	17	129	19 144						
Sub-Total Dist. #4												
Concrete	0.3											
High Type Bit.	45.1	4	9	60	133	64 142						
Low Type Bit.	190.1	62	33	173	91	235 124						
Plain Macadam	22.9			7	31	7 31						
All Types	258.4	66	26	240	93	306 119						
Fergus												
Concrete	1.2											
High Type Bit.	33.0	10	30	40	121	50 151						
Low Type Bit.	46.4	42	90	43	93	85 183						
Plain Macadam	34.4	25	73	34	99	59 172						
All Types	115.0	77	67	117	102	194 169						
Garfield												
Low Type Bit.	60.4	11	18	80	132	91 150						
Plain Macedam	53.2	31	58	65	122	96 180						
Graded & Dreined	21.9	3	14	14	64	17 78						
All Types	135.5	45	33	159	117	204 150						
Petroleum												
Low Type Bit.	40.1	8	20	53	132	61 152						
All Types	40.1	8	20	53	132	61 152						
Sub-Total Dist. #5												
Concrete	1.2											
High Type Bit.	33.0	10	30	40	121	50 151						
Low Type Bit.	146.9	61	42	176	120	237 162						
Plain Macadam	87.6	56	64	99	113	155 177						
Graded & Dreined	21.9	3	14	14	64	17 78						
All Types	290.6	130	45	329	113	459 158						
Cascade												
Bituminous Mac.	2.9			4	138	4 138						
Concrete	0.1											
High Type Bit.	2.6	2	77	2	77	4 154	42.4	10	24	28	66	38 90
Low Type Bit.	101.5	34	33	75	74	109 107	18.5	29	157	25	135	54 292
Plain Macadam							20.6	56	272	30	146	86 418
Plain Gravel							2.9	8	276	1	34	9 310
All Types	107.1	36	34	81	75	117 109	84.4	103	122	84	99	187 221
Chouteau												
Low Type Bit.	71.3	9	13	37	52	46 65						
All Types	71.3	9	13	37	52	46 65						
Judith Basin												
High Type Bit.	18.7	3	16	18	96	21 112						
Low Type Bit.	38.7	7	18	33	85	40 103						
All Types	57.4	10	17	51	89	61 106						
Pondera												
Low Type Bit.	52.2	9	17	61	117	70 134						
All Types	52.2	9	17	61	117	70 134						
Teton												
High Type Bit.	0.6			1	167	1 167						
Low Type Bit.	90.9	12	13	73	80	85 93						
All Types	91.5	12	13	74	81	86 94						
Sub-Total Dist. #6												
Bituminous Mac.	2.9			4	138	4 138						
Concrete	0.1											
High Type Bit.	21.9	5	23	21	96	26 119	42.4	10	24	28	66	38 90
Low Type Bit.	354.6	71	20	279	79	350 99	18.5	29	157	25	135	54 292
Plain Macadam							20.6	56	272	30	146	86 418
Plain Gravel							2.9	8	276	1	34	9 310
All Types	379.5	76	20	304	80	380 100	84.4	103	122	84	99	187 221
Broadwater												
High Type Bit.							15.5			10	65	10 65
Low Type Bit.							64.5	8	12	37	57	45 70
All Types							80.0	8	10	47	59	55 69
Jefferson												
High Type Bit.							100.1	15	15	124	124	139 139
Low Type Bit.							5.5	3	55	12	208	15 263
All Types							105.6	18	17	136	129	154 146

Table 31 (Continued)

Counties and Districts	Non-mountainous							Mountainous						
	Mileage	Less Than ⅔ Minimum Allowed		⅔ of Minimum or More		Total		Mileage	Less Than ⅔ Minimum Allowed		⅔ of Minimum or More		Total	
		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.
Lewis & Clark														
High Type Bit.	0.3			1	333	1	333	47.6	18	38	53	111	71	149
Low Type Bit.	4.3	1	23	1	23	2	46	82.4	12	15	73	88	85	103
All Types	4.6	1	22	2	43	3	65	130.0	30	23	126	97	156	120
Sub-Total Dist. #7														
High Type Bit.	0.3			1	333	1	333	163.2	33	20	187	115	220	135
Low Type Bit.	4.3	1	23	1	23	2	46	152.4	23	15	122	80	145	95
All Types	4.6	1	22	2	43	3	65	315.6	56	18	309	98	365	116
Granite														
High Type Bit.								45.0	24	53	44	98	68	151
Low Type Bit.								17.7	8	45	30	169	38	214
Plain Macedam								6.3			4	64	4	64
Graded & Drained								13.6	37	272	46	338	83	610
All Types								82.6	69	84	124	150	193	234
Mineral														
Concrete								0.1	1	1000			1	1000
High Type Bit.								29.2	21	72	20	69	41	141
Low Type Bit.								49.8	39	78	62	124	101	202
All Types								79.1	61	77	82	104	143	181
Missoula														
Concrete								0.1						
High Type Bit.								75.8	21	28	61	80	82	108
Low Type Bit.								17.8	16	90	30	168	46	258
Plain Macadam								3.2	1	31	4	125	5	156
Graded & Drained								1.7						
All Types								98.6	38	39	95	96	133	135
Powell														
High Type Bit.								61.9	7	11	45	73	52	84
All Types								61.9	7	11	45	73	52	84
Revalli														
High Type Bit.								44.2	8	18	9	20	17	38
Low Type Bit.								6.9						
Graded & Drained								40.1	159	397	31	77	190	474
All Types								91.2	167	183	40	44	207	227
Sanders														
High Type Bit.								28.9	8	28	39	135	47	163
Low Type Bit.								85.8	56	65	126	147	182	212
Plain Macadam								6.4	1	16	12	187	13	203
All Types								121.1	65	54	177	146	242	200
Sub-Total Dist. #8														
Concrete								0.2	1	500			1	500
High Type Bit.								285.0	89	31	218	77	307	108
Low Type Bit.								178.0	119	67	248	139	367	206
Plain Macadam								15.9	2	12	20	126	22	138
Graded & Drained								55.4	196	354	77	139	273	493
All Types								534.5	407	76	563	105	970	181
Beaverhead														
High Type Bit.								85.9	5	6	45	52	50	58
All Types								85.9	5	6	45	52	50	58
Deer Lodge														
Concrete								8.0						
High Type Bit.								30.9	4	13	18	58	22	71
Low Type Bit.								3.5	2	57	6	171	8	228
All Types								42.4	6	14	24	57	30	71
Silver Bow														
Concrete								14.4			15	104	15	104
High Type Bit.								41.3	16	39	42	101	58	140
Low Type Bit.								3.9						
All Types								59.6	16	27	57	95	73	122
Madison														
Concrete								0.1						
High Type Bit.								22.7	1	4	30	132	31	136
Low Type Bit.								71.8	3	4	50	70	53	74
Plain Macedam								15.9			2	13	2	13
Plain Gravel								8.9	11	124	10	112	21	236
All Types								119.4	15	13	92	77	107	90
Sub-Total Dist. #9														
Concrete								22.5			15	67	15	67
High Type Bit.								180.8	26	14	135	75	161	89
Low Type Bit.								79.2	5	6	56	71	61	77
Plain Macadam								15.9			2	13	2	13
Plain Gravel								8.9	11	124	10	112	21	236
All Types								307.3	42	14	218	71	260	85
Gallatin														
High Type Bit.								49.5	11	22	31	63	42	85
Low Type Bit.								29.5	8	27	14	48	22	75
All Types								79.0	19	24	45	57	64	81
Park														
Concrete								0.1						
High Type Bit.	18.7	3	16	12	64	15	80	55.0	2	4	86	156	88	160
Low Type Bit.								33.8	3	9	64	189	67	198
Plain Macadam								19.1	2	10	30	157	32	167
All Types	18.7	3	16	12	64	15	80	108.0	7	6	180	167	187	173

Table 31 (Continued)

Counties and Districts	Non-mountainous							Mountainous						
	Mileage	Less Than ⅔ Minimum Allowed		⅔ of Minimum or More		Total		Mileage	Less Than ⅔ Minimum Allowed		⅔ of Minimum or More		Total	
		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.
Meagher														
Low Type Bit.								63.5	28	44	64	101	92	145
Plain Macadam								4.6	1	22	3	65	4	87
Plain Gravel								19.9	22	111	46	231	68	342
Graded & Drained								7.0	8	114	14	200	22	314
All Types								95.0	59	62	127	134	186	196
Sweet Grass														
High Type Bit.	36.4	7	19	29	80	36	99							
All Types	36.4	7	19	29	80	36	99							
Wheatland														
Low Type Bit.	44.4	10	22	42	95	52	117							
All Types	44.4	10	22	42	95	52	117							
Sub-Total Dist. #10														
Concrete								0.1						
High Type Bit.	55.1	10	18	41	74	51	92	104.5	13	12	117	112	130	124
Low Type Bit.	44.4	10	22	42	95	52	117	126.8	39	31	142	112	181	143
Plain Macadam								23.7	3	13	33	139	36	152
Plain Gravel								19.9	22	111	46	231	68	342
Graded & Drained								7.0	8	114	14	200	22	314
All Types	99.5	20	20	83	84	103	104	282.0	85	30	352	125	437	155
Big Horn														
Low Type Bit.	78.5	25	32	35	45	60	77							
Graded & Drained	8.1			7	87	7	87							
All Types	86.6	25	29	42	48	67	77							
Carbon														
High Type Bit.	4.2	5	119	14	333	19	452							
Low Type Bit.	84.8	13	15	37	44	50	59							
All Types	89.0	18	20	51	57	69	77							
Golden Valley														
High Type Bit.	16.1	4	25	7	43	11	68							
Low Type Bit	12.0	6	50	13	108	19	158							
All Types	28.1	10	36	20	71	30	107							
Musselshell														
Low Type Bit.	63.1	49	78	52	82	101	160							
Graded & Drained	33.6	2	6	6	18	8	24							
All Types	96.7	51	53	58	60	109	113							
Stillwater														
High Type Bit.	38.1	10	26	35	92	45	118							
All Types	38.1	10	26	35	92	45	118							
Treasure														
High Type Bit.	28.7	24	84	21	73	45	157							
All Types	28.7	24	84	21	73	45	157							
Yellowstone														
Concrete	0.2													
High Type Bit.	10.3	4	39	2	19	6	58							
Low Type Bit.	118.2	65	55	68	58	133	113							
All Types	128.7	69	54	70	54	139	108							
Sub-Total Dist. #11														
Concrete	0.2													
High Type Bit.	97.4	47	48	79	81	126	129							
Low Type Bit.	356.6	158	44	205	57	363	101							
Graded & Drained	41.7	2	5	13	31	15	36							
All Types	495.9	207	42	297	60	504	102							
Carter														
Low Type Bit.	38.4	4	10	27	70	31	81							
Plain Macadam	11.6	5	43	9	78	14	121							
All Types	50.0	9	18	36	72	45	90							
Custer														
High Type Bit.	27.4	26	95	14	51	40	146							
Low Type Bit.	133.1	45	34	156	117	201	151							
All Types	160.5	71	44	170	106	241	150							
Fallon														
High Type Bit.	3.4			5	147	5	147							
Low Type Bit.	26.9	3	11	48	179	51	190							
Plain Macadam	37.0	31	84	60	162	91	246							
All Types	67.3	34	50	113	168	147	218							
Powder River														
Low Type Bit.	47.3	16	34	72	152	88	186							
Graded & Drained	24.2			23	95	23	95							
All Types	71.5	16	22	95	133	111	155							
Rosebud														
High Type Bit.	25.5	21	82	26	102	47	184							
Low Type Bit.	33.5	11	33	37	110	48	143							
Plain Macadam	12.7													
All Types	71.7	32	45	63	88	95	133							
Sub-Total Dist. #12														
High Type Bit.	56.3	47	83	45	80	92	163							
Low Type Bit.	279.2	79	28	340	122	419	150							
Plain Macadam	61.3	36	59	69	112	105	171							
Graded & Drained	24.2			23	95	23	95							
All Types	421.0	162	38	477	114	639	152							
Grand Total														
Bituminous Mac.	2.9			4	138	4	138							
Concrete	1.8							23.3	1	4	15	65	16	69
High Type Bit.	449.8	159	35	364	81	523	116	913.2	218	24	909	99	1127	123

Table 31 (Continued)

Counties and Districts	Non-mountainous						Mountainous					
	Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total	Mileage	Less Than ½ Minimum Allowed		½ of Minimum or More		Total
		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.		No.	No. Per 100 Mi.	No.	No. Per 100 Mi.	No.	No. Per 100 Mi.
Grand Total (Continued)														
Low Type Bit.	2001.1	761	38	1753	88	2514	126	696.5	253	36	818	118	1071	154
Plain Macadam	181.9	92	51	175	96	267	147	151.0	146	97	195	129	341	226
Plain Gravel	3.4							62.9	88	140	129	205	217	345
Graded & Drained	67.8	5	6	50	57	55	63	104.8	215	205	120	114	335	319
All Types	2728.7	1017	37	2346	86	3363	123	1951.7	921	47	2186	112	3107	159

Significant data deriving from the tabulation are as follows:

A. Mountainous Districts - 21 Counties

1. Concrete

There is one instance in Missoula County wherein sight distance is restricted to less than 325 feet. In Silver Bow County, with an aggregate length of 14.4 miles, there are 15 instances wherein the sight distances are limited to an interval of less than 650 feet and more than 325 feet.

2. High Type Bituminous

a. Sights Restricted to Less Than 325 Feet

There are 18 counties in which there are occurrences of restricted sights of less than 325 feet. On the average these restricted sights occur at the rate of 24 instances per 100 miles traversed. The major portion of restricted sights occur at a rate of less than 20 instances per 100 miles. Half the restricted sights occur at the rate of less than 18 instances per 100 miles.

b. Sights Restricted to Less Than 650 Feet and More Than 325 Feet.

There are 19 counties in which there are instances wherein the sight distances are restricted to a length of less than 650 feet and more than 325 feet. On the average these restrictions occur at the rate of 99 per 100 miles of roadway. Most restricted sights (324-650) occur at the rate of 60-69 per 100 miles traversed. Half the restrictions occur at the rate of less than 94 per 100 miles.

3. Low Type Bituminous

a. Sights Restricted to Less Than 325 Feet.

There are 16 counties in which sight distances are restricted. On the average these restrictions occur at the rate of 36 per 100 miles of roadway. Most restrictions as a group occur at the rate of 10-19 per 100 miles. Half the mileage bears restrictions at the rate of less than 24 occurrences per 100 miles.

b. Sights Restricted to Less Than 650 Feet and More Than 325 Feet

There are 18 counties in which there are instances of sight restrictions. On the average these restrictions occur at the rate of 118 per 100 miles. Half the mileage bears restrictions at the rate of less than 125 per 100 miles.

4. Plain Macadam

a. Sights Restricted to Less Than 325 Feet

There are 8 counties in which sight restrictions occur. The average rate of occurrence is 97 per 100 miles. Excessively high degrees of occurrence are manifest east of Belton on US 2 and from Riceville to Neihart in Cascade County. Most restrictions occur in the class interval 30-39 per 100 miles. Half the mileage bears restricted sights at the rate of less than 32 per 100 miles.

b. Sights Restricted to Less Than 650 Feet and More Than 325 Feet

There are 10 counties in which there are instances of sight restrictions. On the average these restrictions occur at the rate of 129 per 100 miles. Most restrictions occur in the class interval 120-129. Half the mileage bears restrictions at a rate of less than 127 per 100 miles.

5. Plain Gravel

a. Sights Restricted to Less Than 325 Feet

There are 5 counties in which there are occurrences of sight restrictions. The average rate of occurrence is 140 restrictions per 100 miles. Most restrictions occur in the class interval 160-169 per 100 mi. Half the mileage bears restrictions at a rate of less than 129 per 100 miles traversed.

b. Sights Restricted to Less Than 650 Feet and More Than 325 Feet

There are 5 counties in which there are occurrences of sight restrictions. The average rate of occurrence is 205 per 100 miles of roadway. Most restrictions occur in the class interval 200-229 per 100 miles. Half the mileage bears restricted sights at the rate of less than 126 per 100 miles.

6. Graded & Drained

a. Sights Restricted to Less Than 325 Feet

There are 4 counties in which there are occurrences of sight restrictions. These restrictions occur at an average rate of 205 per 100 miles. Most of the restrictions occur at a rate of 397 per 100 miles particularly on the Skalkaho Highway in Ravalli County. Half the mileage bears restrictions at a rate less than 101 per 100 miles.

b. Sights Restricted to Less Than 650 Feet and More Than 325 Feet

There are 5 counties in which sight restrictions are in evidence. These restrictions occur at an average rate of 114 per 100 miles. Most of the restrictions occur at a rate of 70-79 restrictions per 100 miles. Half the mileage bears restrictions at a rate of less than 80 per 100 miles.

B. Non-mountainous District - 39 Counties

1. Bituminous Macadam

There is one instance of this type of construction, there being no sights restricted to less than 500 feet. There are 4 instances wherein the sights are restricted to less than 1,000 feet, these restrictions occurring at an average of 138 per 100 miles.

2. Concrete

There are no sight restrictions on this type of construction in the non-mountainous district.

3. High Type Bituminous

a. Sights Restricted to Less Than 500 Feet

There are 20 counties in which sights are restricted. Most restrictions occur at a rate of 10-19 per 100 miles. The average rate of occurrence is 35 per 100 miles. Half the mileage bears restrictions at a rate less than 25 per 100 miles.

b. Sights Restricted to Less Than 1,000 Feet and More Than 500 Feet

There are 24 counties in which there are occurrences of sight restrictions. The average rate of occurrence is 81 per 100 miles of roadway. Most restrictions occur in the class interval 90-99. Half the mileage bears restrictions at a rate of less than 76 per 100 miles.

4. Low Type Bituminous

a. Sights Restricted to Less Than 500 Feet

There are 33 counties wherein sights are restricted. The average rate of occurrence of the restrictions is 38 per 100 miles of roadway. Most restrictions occur at the rate of 30-39 per 100 miles. Half the mileage bears restrictions at a rate of less than 33 per 100 miles.

b. Sights Restricted to Less Than 1,000 Feet and More Than 500 Feet

There are 34 counties in which restrictions are in evidence. These restrictions occur at an average rate of 88 per 100 miles of roadway. Most restrictions occur in the rate interval 70-79 per 100 miles. Half the mileage bears restrictions at a rate of less than 82 per 100 miles.

5. Plain Macadam

a. Sights Restricted to Less Than 500 Feet

There are 4 counties in which there are occurrences of restricted sights. The average of these occurrences is 51 per 100 miles. Most restrictions occur at a rate of 80-89 per 100 miles. Half the mileage bears restrictions at a rate less than 56 per 100 miles of roadway.

b. Sights Restricted to Less Than 1,000 Feet and More Than 500 Feet

There are 6 counties in which sight restrictions occur at an average rate of 96 per 100 miles. Most restrictions occur in the class interval 160-169 per 100 miles. Half the mileage bears restrictions at a rate of less than 99 per 100 miles.

6. Plain Gravel

There are no sight restrictions in evidence on this type of construction.

7. Graded & Drained

a. Sights Restricted to Less Than 500 Feet

There are two counties wherein sight restrictions are in evidence. These restrictions occur at an average rate of 6 per 100 miles. Most restrictions occur in the class interval 0-9 per 100 miles. Half the mileage bears restrictions at the rate of less than 6 per 100 miles.

b. Sights Restricted to Less Than 1,000 Feet and More Than 500 Feet

There are 4 counties in which sight restrictions occur. The average rate of such occurrences is 57 per 100 miles. Most restrictions occur in the class interval 10-19 per 100 miles. Half the mileage bears restrictions at a rate of less than 64 per 100 miles.

Since, in the equation of highway design, restricted sight distances enter as a consequence of circuitous alignment and short vertical curves, we might readily state that an excessively high degree of sight restriction is that which is less than 325 feet, and occurring at a rate in excess of 20 per 100 miles of roadway in the mountainous district. In the non-mountainous district the critical distance would be 500 feet and the rate of occurrence presenting approximately equal hazard would be greater than 30 occurrences per 100 miles. With these criteria in mind then we find the location of excessive sight restrictions to be as follows:

Table 32A

LOCATION OF EXCESSIVE DEGREE OF SIGHT RESTRICTION IN MOUNTAINOUS DISTRICT

Excessive degree of sight restriction - Less than 325 Feet and Occurring at Rate of One or More Per 100 Miles

•Coincident with high degree of curvature

County	F. A. Route No.	Project No.	Surface Types: Concrete Mi.	Concrete Rate	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Rate	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Rate	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Rate	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Rate	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Rate	Graded & Drained Tr.	All Types Mi.	All Types Rate	All Types Tr.
Flathead	1	58B							3.8	26	58										3.8	26	58
		58A•							3.9	103	112										3.9	103	112
		58D•							7.0	57	173										7.0	57	173
		257F							0.8	125	365										0.8	125	365
		FH 13C,D,E,F,•				9.0	278	110				16.5	418	123							25.5	369	119
		FH 13G,H,I,J,•				18.4	44	101													18.4	44	101
		257A							1.7	59	365										1.7	59	365
						27.4	121	104	17.2	63	162	16.5	418	123							61.1	185	126
	5	FH 12A,B,•							11.3	62	97										11.3	62	97
		191E				8.3	24	488													8.3	24	488
		191D•				2.7	111	400													2.7	111	400
						11.0	45	466	11.3	62	97										22.3	54	279
	38	100A													3.2	31	218				3.2	31	218
															3.2	31	218				3.2	31	218
Lake	5	191D				7.2	28	501													7.2	28	501
		191B							7.1	99	451										7.1	99	451
		192A, B, C,				3.7	54	765	0.3	-	713										4.0	50	761
						10.9	36	591	7.4	95	565										18.3	60	580
Lincoln	1	FH 1A• C										10.9	55	90							10.9	55	90
		58C•																7.6	145	50	7.6	145	50
												10.9	55	90				7.6	145	50	18.5	92	74
	5	263A							9.2	43	101										9.2	43	101
		FH 12A							2.3	30	87										2.3	30	87
									11.5	40	98										11.5	40	98
	33	137•													3.0	133	55				3.0	133	55
		145A•													7.4	162	51				7.4	162	51
		FH 57A•										10.3	78	52							10.3	78	52
		FH 57B										10.4	29	61							10.4	29	61
		145D•													9.1	263	56				9.1	263	56
		118A•													1.7	352	58				1.7	352	58
												20.7	53	56	21.2	216	54				41.9	136	55
District #1						49.3	85	293	47.4	63	214	48.1	160	86	24.4	192	76	7.6	145	50	176.8	123	174
Glacier	1	260•				6.0	50	101													6.0	50	101
		FH 13A,B				5.4	93	131													5.4	93	131
						11.4	48	115													11.4	48	115
District #2						11.4	48	115													11.4	48	115
Cascade	3	218B				2.5	40	766													2.5	40	766
		172B				7.4	27	422													7.4	27	422
		172C				8.4	83	435													8.4	83	435
						18.3	55	458													18.3	55	458
	11	73							10.7	196	180										10.7	196	180
		FH 32E•										5.0	180	101	2.9	276	126				7.9	215	110
		FH 32D•										4.8	392	95							4.8	392	95
		FH 32A•							3.6	83	109	11.0	264	108							14.6	219	106
		FH 32I							0.8	125	103										0.8	125	103
		FH 32H							2.8	143	99										2.8	143	99
									17.9	162	150	20.6	272	103	2.9	276	126				41.4	224	125
District #6						18.3	55	458	17.9	162	150	20.6	272	103	2.9	276	126				59.7	210	227
Broadwater	14	FH 31A,B							9.4	85	56										9.4	85	56
									9.4	85	56										9.4	85	56
Jefferson	2	248A				5.0	20	524													5.0	20	524
	3	17°A•							4.6	65	784										4.6	65	784
		178D				6.0	50	458													6.0	50	458
		242C				8.7	23	542													8.7	23	542
		242A•				10.0	40	636													10.0	40	636
						24.7	37	539	4.6	65	784										29.3	42	576
Lewis & Clark	3	172A•				5.3	75	453													5.3	75	453
		269A•				10.2	85	476													10.2	88	476
						15.5	84	468													15.5	84	468
	8	FH 28B•				4.9	102	508													4.9	102	508
						4.9	102	508													4.9	102	508
	9	238C•							8.8	80	82										8.8	80	82
									8.8	80	82										8.8	80	82
	24	176D							5.5	36	81										5.5	36	81
									5.5	36	81										5.5	36	81
District #7						50.1	56	512	28.3	71	187										78.4	62	395
Granite	2	92				8.0	49	670													8.0	49	670
		184A-B							8.7	69	732										8.7	69	732
		184C				2.0	50	740													2.0	50	740
						10.0	49	684	8.7	69	732										18.7	58	706
	19	78A•				10.1	168	255													10.1	168	255
		78C				0.4	250	318													0.4	250	318
		175				3.4	29	352													3.4	29	352
		FH 17A•							3.1	65	301										3.1	65	301
						13.9	136	281	3.1	65	301										17.0	123	285
	35	FH 16A & B																13.6	272	29	13.6	272	29
																		13.6	272	29	13.6	272	29
Mineral	2	183A•							2.9	138	566										2.9	138	466
		183B•							2.4	125	555										2.4	125	555
		FH 8G•							4.7	234	554										4.7	234	554
		FH 8H							3.7	135	553										3.7	135	553
		FH 8J				5.5	163	568	0.6	-	581										6.1	147	569
		FH 8K•				7.6	197	513													7.6	197	513
		FH 8-O•							0.2	500	516										0.2	500	516
		254A							3.9	77	590										3.9	77	590
		FH 8C•							3.7	81	521										3.7	81	521
		FH 8E•							4.1	98	499										4.1	98	499
		233	0.1	1000	487																0.1	1000	487
		FH 8A,M				8.9	23	465													8.9	23	465
		FH 8F							0.9	334	451										0.9	334	451
			0.1	1000	487	22.0	118	507	27.1	137	544										49.2	130	623

County	F. A. Route No.	Project No.	Surface Types: Concrete Mi.	Concrete Rate	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Rate	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Rate	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Rate	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Rate	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Rate	Graded & Drained Tr.	All Types Mi.	All Types Rate	All Types Tr.
Missoula	2	FH 8F							3.2	63	438										3.2	63	438
		271B				0.9	333	438													0.9	333	438
		FH 8D•							3.3	423	450										3.3	423	450
		231C•				3.0	33	1737													3.0	33	1737
		231A				1.3	154	958													1.3	154	958
		206				0.9	333	938													0.9	333	938
		131A, B•				18.3	38	807													18.3	38	807
						24.4	65	921	6.5	246	444										30.9	103	821
	5	219A•							2.8	71	613										2.8	71	613
									2.8	71	613										2.8	71	613
	7	215D				2.6	78	1115													2.6	78	1115
		215B				1.9	105	835													1.9	105	835
						4.5	89	997													4.5	89	997
	24	237B				4.0	25	253													4.0	25	253
		237A•										3.2	31	100							3.2	31	100
						4.0	25	253				3.2	31	100							7.2	28	185
Powell	2	184E				15.1	40	671													15.1	40	671
						15.1	40	671													15.1	40	671
	6	FH 28A				4.2	48	467													4.2	48	467
						4.2	48	467													4.2	48	467
Ravalli	7	259A				15.7	32	531													15.7	32	531
		174•				1.5	133	337													1.5	133	337
		FH 19D																3.4	118	75	3.4	118	75
		FH 19C																6.1	16	53	6.1	16	53
		FH 19A1,B•																7.5	267	51	7.5	267	51
						17.2	40	515										17.0	147	57	34.2	105	287
	35	161A•																16.5	812	54	16.5	812	54
																		16.5	812	54	16.5	812	54
Sanders	6	FH 6G							3.2	31	107										3.2	31	107
		FH 6F•							1.9	53	107										1.9	53	107
		FH 6E•							3.6	83	107										3.6	83	107
		FH 6B							6.8	44	116										6.8	44	116
		FH 6B•							5.5	91	129										5.5	91	129
		FH 6C•							4.3	23	133										4.3	23	133
		FH 6I							5.2	38	137										5.2	38	137
		90							1.4	72	140										1.4	72	140
		FH 6D•							4.4	42	153										4.4	42	153
		FH 6A							4.0	25	396										4.0	25	396
		202							4.0	250	416										4.0	250	416
		223B•				5.8	69	366													5.8	69	366
		223C				3.6	83	176													3.6	83	176
		186•							14.0	157	237										14.0	157	237
		88•							5.1	39	304										5.1	39	304
						9.4	74	293	63.4	85	200										72.8	83	212
	30	3A										4.7	21	92							4.7	21	92
												4.7	21	92							4.7	21	92
District #8			0.1	1000	487	124.7	74	589	111.6	105	352	7.9	25	95				47.1	416	48	291.4	140	397
Deer Lodge	19	FH 17A•							3.5	57	298										3.5	57	298
		164A				15.0	27	543													15.0	27	543
						15.0	27	543	3.5	57	298										18.5	33	497
Silver Bow	2	159•				2.3	348	823													2.3	348	823
		FH 2LA				0.6	167	798													0.6	167	798
						2.9	311	818													2.9	311	818
	3	241C				28.8	21	432													28.8	21	432
						28.8	21	432													28.8	21	432
Madison	13	FH 45A							3.9	51	134										3.9	51	134
									3.9	51	134										3.9	51	134
	29	98•													4.3	256	107				4.3	256	107
															4.3	256	107				4.3	256	107
District #9						46.7	41	492	7.4	54	212				4.3	256	107				58.4	56	429
Gallatin	2	44				4.2	24	1168	1.5	-	1025										5.7	18	1130
		222•				8.6	58	911													8.6	58	911
		166				3.9	128	778													3.9	128	778
						16.7	65	945	1.5	-	1025										18.2	60	952
	13	FH 45B•							1.8	278	117										1.8	278	117
		FH 45C							4.4	23	114										4.4	23	114
		171D							2.3	44	214										2.3	44	214
									8.5	83	142										8.5	83	142
Park	11	239A										5.7	35	71							5.7	35	71
		14•				4.2	24	748													4.2	24	748
		FH 43A							1.7	177	301										1.7	177	301
						4.2	24	748	1.7	177	301	5.7	35	71							11.6	52	350
Meagher	11	FH 32H,F•							1.9	210	89										1.9	210	89
		FH 32B							2.8	357	75										2.8	357	75
		FH 32C							6.9	188	66										6.9	188	66
		94B•													7.0	143	67				7.0	143	67
		94A•													7.5	147	76				7.5	147	76
		94C										1.8	56	85							1.8	56	85
									11.6	232	72	1.8	56	85	14.5	145	72				27.9	175	73
	14	8C													3.5	29	110				3.5	29	110
		8B																7.0	114	100	7.0	114	106
															3.5	29	110	7.0	114	100	10.5	86	107
District #10						20.9	57	813	23.3	159	175	7.5	40	74	18.0	122	77	7.0	114	106	76.7	107	337
Mountainous District			0.1	1000	487	321.4	65	514	235.9	101	268	84.1	149	126	49.6	177	83	61.7	349	55	752.8	116	328
Total Lengths & Averages			23.3	4	1536	913.2	24	489	696.5	36	279	151.0	97	100	62.9	140	94	104.8	205	59	1951.7	47	360
Coincident with Excessive Curvature	Forest Highways					39.9	20↗	232	67.8	20↗	221	52.4	20↗	98	2.9	20↗	136	7.5	20↗	51	170.5	20↗	177
	State Highways					91.9	20↗	613	51.5	20↗	301	3.2	20↗	100	40.0	20↗	67	24.1	20↗	53	210.7	20↗	361
	Federal Aid System					131.8	20↗	497	119.3	20↗	255	55.6	20↗	98	42.9	20↗	72	31.0	20↗	53	381.2	20↗	279

Table 32B

LOCATION OF EXCESSIVE DEGREE OF SIGHT RESTRICTION IN NON-MOUNTAINOUS DISTRICT

Excessive degree of sight restriction - Less than 500 feet and occurring at rate of one or more per 100 miles.

•Coincident with high degree of curvature

County	F. A. Route No.	Project No.	Surface Types: Concrete Mi.	Concrete Rate	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Rate	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Rate	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Rate	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Rate	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Rate	Graded & Drained Tr.	All Types Mi.	All Types Rate	All Types Tr.
Blaine	1	66•				5.7	105	650	6.9		576										12.6	40	609
						5.7	105	650	6.9		576										12.6	48	609
Glacier	1	226•				2.3	44	253	11.9	244	138										14.2	211	157
		220B							8.2	49	741										8.2	49	741
						2.3	44	253	20.1	164	384										22.4	152	370
	3	208							10.6	47	119										10.6	47	119
		227B•							8.4	214	272										8.4	214	272
		210•							6.1	43	142										6.1	43	142
		227A•							14.2	268	131										14.2	268	131
		190•							21.9	146	137										21.9	146	137
									61.2	156	150										61.2	156	150
Hill	1	132B				9.3	32	317													9.3	32	317
		95A•				8.1	148	651													8.1	148	651
						17.4	86	471													17.4	86	471
Liberty	1	132C				10.0	50	194													10.0	50	194
						10.0	50	194													10.0	50	194
Toole	1	154B							6.2	65	428										6.2	65	428
		154A•							6.5	92	460										6.5	92	460
									12.7	79	445										12.7	79	445
	21	243A							5.8	35	355										5.8	35	355
		67A•							9.5	74	327										9.5	74	327
									15.3	68	338										15.3	68	338
District #2						25.4	76	408	116.2	128	273										151.6	121	333
Daniels	22	251A•							7.3	69	204										7.3	69	204
		251B							10.2	78	155										10.2	78	155
									17.5	74	175										17.5	74	175
Phillips	1	152A				2.0	50	330													2.0	50	330
		153B				13.8	44	429													13.8	44	429
						15.8	45	416													15.8	45	416
Roosevelt	1	84A•							9.6	73	407										9.6	73	407
		84F•							3.5	431	281										3.5	431	281
		240B•							1.9	105	264										1.9	105	264
		84G•							3.4	235	275										3.4	235	275
		84J							11.0	108	284										11.0	108	284
									29.4	149	322										29.4	149	322
	22	193C							6.7	60	246										6.7	60	246
		193A•							7.3	96	278										7.3	96	278
		273A•							2.4	83	101										2.4	83	101
									16.4	79	239										16.4	79	239
	32	266B							4.0	75	93										4.0	75	93
									4.0	75	93										4.0	75	93
Sheridan	22	193B							10.7	121	193										10.7	121	193
									10.7	121	193										10.7	121	193
Valley	1	155B				2.8	36	532	12.2	49	606										15.0	47	592
		144							14.2	49	567										14.2	49	567
		189•							15.8	38	499										15.8	38	499
						2.8	36	532	42.2	44	554										45.0	43	552
District #3						18.6	44	433	120.2	86	350										138.8	80	362
Dawson	15	246C							6.9	43	128										6.9	43	128
		246A							13.0	38	195										13.0	38	195
									19.9	40	172										19.9	40	172
	17	130A•							15.7	32	225										15.7	32	225
									15.7	32	225										15.7	32	225
	20	245C							12.9	78	175										12.9	78	175
									12.9	78	175										12.9	78	175
McCone	25	253C							13.1	31	90										13.1	31	90
		253B							7.6	105	116										7.6	105	116
									20.7	58	100										20.7	58	100
Prairie	17	158C							13.1	46	372										13.1	46	372
		130D•							0.3	667	380										0.3	667	380
									13.4	60	372										13.4	60	372
Richland	20	245E•							15.9	31	296										15.9	31	296
		245B•							2.7	111	228										2.7	111	228
									18.6	43	286										18.6	43	286
	26	265A							6.8	88	91										6.8	88	91
									6.8	88	91										6.8	88	91
District #4									108.0	53	205										108.0	53	205
Fergus	15	235C•				6.5	31	408													6.5	31	408
		229A•				3.9	103	359													3.9	103	359
		229B•				6.0	33	324													6.0	33	324
						16.4	50	366													16.4	50	366
	16	26A•							6.0	300	181										6.0	300	181
		27•							10.8	148	172										10.8	148	172
		28							2.4	125	162										2.4	125	162
									19.2	193	174										19.2	193	174
	43	103B•							14.2	85	310										14.2	85	310
		103C•										21.8	110	84							21.8	110	84
									14.2	85	310	21.8	110	84							36.0	100	173
Garfield	15	256E										21.8	74	70							21.8	74	70
		256F										18.7	43	74							18.7	43	74
		256G										12.7	55	96							12.7	55	96
												53.2	59	78							53.2	59	78

Table 32B (Continued)

County	F A. Route No.	Project No.	Surface Types: Concrete Mi.	Concrete Rate	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Rate	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Rate	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Rate	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Rate	Plain Gravel Tr.	Graded & Dreined Mi.	Graded & Dreined Rate	Graded & Dreined Tr.	All Types Mi.	All Types Rate	All Types Tr.
Garfield	18	157E							20.9	33	106										20.9	33	106
									20.9	33	106										20.9	33	106
Petroleum	15	258B•							0.5	200	92										0.5	200	92
									0.5	200	92										0.5	200	92
	16	28							4.9	102	174										4.9	102	174
									4.9	102	174										4.9	102	174
District #5						16.4	50	366	69.7	104	182	75.0	74	79							151.1	83	151
Cascade	3	65B•							13.6	37	333										13.6	37	333
									13.6	37	333										13.6	37	333
	11	64A•							16.6	60	624										16.6	60	624
		64C•				0.8	250	607													0.8	250	607
		64B•							1.4	72	600										1.4	72	600
						0.8	250	607	18.0	61	622										18.8	69	622
	15	235D•							7.3	69	256										7.3	69	256
									7.3	69	256										7.3	69	256
	21	211A•							10.4	48	427										10.4	48	427
		10							0.2	500	434										0.2	500	434
									10.6	57	427										10.6	57	427
Chouteau	10	252E							8.3	48	420										8.3	48	420
									8.3	48	420										8.3	48	420
Judith Basin	15	235E							10.3	58	274										10.3	58	274
									10.3	58	274										10.3	58	274
Pondera	3	236B•							5.6	54	140										5.6	54	140
									5.6	54	140										5.6	54	140
District #6						0.8	250	607	73.7	54	397										74.5	56	399
Lewis & Clark	9	275A							3.0	33	117										3.0	33	117
									3.0	33	117										3.0	33	117
District #7									3.0	33	117										3.0	33	117
Sweet Grass	2	127A•				5.3	38	644													5.3	38	644
		127C				3.0	67	597													3.0	67	597
		127D				2.8	71	580													2.8	71	580
						11.1	53	614													11.1	53	614
Wheatland	14	115B•							6.4	47	196										6.4	47	196
									6.4	47	196										6.4	47	196
District #10						11.1	53	614	6.4	47	196										17.5	51	461
Big Horn	16	212•							40.7	54	372										40.7	54	372
									40.7	54	372										40.7	54	372
Carbon	4	107D•							2.9	69	823										2.9	69	823
		107C							7.0	57	604										7.0	57	604
		258C							1.9	53	817										1.9	53	817
									11.8	59	690										11.8	59	690
	28	FH 59A				4.2	119	262													4.2	119	262
						4.2	119	262													4.2	119	262
Golden Valley	14	115B							2.6	115	165										2.6	115	165
		268B							5.1	39	150										5.1	39	150
									7.7	65	156										7.7	65	156
Musselshell	14	33•							1.0	100	1179										1.0	100	1179
									1.0	100	1179										1.0	100	1179
	16	138B•							3.0	133	289										3.0	133	289
		33•							3.2	156	953										3.2	156	953
		108A•							11.5	157	325										11.5	157	325
		108B•							6.5	216	320										6.5	216	320
		108C							4.2	71	316										4.2	71	316
									28.4	154	390										28.4	154	390
Stillwater	2	123B•				8.3	48	613													8.3	48	613
		109•				4.7	64	607													4.7	64	607
						13.0	53	609													13.0	53	609
Treasure	2	160D•				17.7	135	398													17.7	135	398
						17.7	135	398													17.7	135	398
Yellowstone	2	228A•							0.2	1000	2382										0.2	1000	2382
		53A•							13.0	100	1080										13.0	100	1080
		160B•							2.3	392	438										2.3	392	438
		160D				5.3	76	420													5.3	76	420
						5.3	76	420	15.5	155	1001										20.8	155	1001
	4	134•							3.3	60	926										3.3	60	926
									3.3	60	926										3.3	60	926
	16	108C							19.7	112	422										19.7	112	422
		187C•							5.4	111	418										5.4	111	418
		187A•							14.1	163	365										14.1	163	365
		187D							5.2	58	322										5.2	58	322
									44.4	122	392										44.4	122	392
District #11						34.9	102	460	152.8	104	476										187.7	104	474
Carter	27	47•										11.6	43	104							11.6	43	104
												11.6	43	104							11.6	43	104
Custer	2	135B•				3.8	237	405													3.8	237	405
		135D•				10.6	160	495													10.6	160	495
		86E							22.4	31	142										22.4	31	142
						14.4	180	471	22.4	31	142										36.8	89	270

Table 32B (Continued)

County	F. A. Route No.	Project No.	Surface Types																		
			Concrete			High Type Bituminous			Low Type Bituminous			Plain Macadam			Plain Gravel			Graded & Drained			All Types		
			Mi.	Rate	Tr.	Mi.	Rate	Tr.	Mi.	Rate	Tr.	Mi.	Rate	Tr.	Mi.	Rate	Tr.	Mi.	Rate	Tr.	Mi.	Rate	Tr.
	17	1588•							16.6	133	347										16.6	133	347
									16.6	133	347										16.6	133	347
	23	156C							6.4	62	82										6.4	62	82
									6.4	62	82										6.4	62	82
Fallon	2	86B•				3.4	-	181				11.7	43	167							15.1	33	170
						3.4	-	181				11.7	43	167							15.1	33	170
	27	48A•										25.3	103	129							25.3	103	129
												25.3	103	129							25.3	103	129
Powder River	23	198B•							8.4	60	98										8.4	60	98
		198A•							6.4	78	133										6.4	78	133
									14.8	68	114										14.8	68	114
Rosebud	2	15•							4.3	186	500										4.3	186	500
		135A•				6.2	129	289													6.2	129	489
		135C•				13.2	83	445													13.2	83	445
		135B•				6.1	33	436													6.1	33	436
						25.5	82	454	4.3	186	500										29.8	97	461
District #12						43.3	108	439	64.5	79	206	48.6	74	132							156.4	86	248
Non-mountainous District						160.5	83	432	704.5	93	334	123.6	74	100							988.6	89	321
Total Lengths and Avorages			1.8	-	864	449.8	35	525	2001.1	38	305	181.9	51	98	3.4	-	738	87.8	6	44	2728.7	37	320
Coincident With Excessive Curveture						111.2	30/	480	357.1	30/	359	45.1	30/	110							513.4	30/	364

N. B. 2.9 miles bituminous concrete, no sights restricted to less than 500 feet, average traffic 614.

On review of the tabulations, we find an excessively high degree of sight restriction as follows:

A. Mountainous District

1. Concrete

One restriction, 0.1 miles in length in Mineral County. Since the restriction is not coincident with excess curvature the sight restriction is probably due to an abrupt grade break or interferenco by abutting structures.

2. High Type Bituminous Surfacing

Approximately 35% of the total mileage bears excessive sight restriction, of which 41% is coincident with mileage of excessive high degree of curvature. Traffic volumes are about 5% greater than the average for the district.

3. Low Type Bituminous Surfacing

Approximately 34% of the total mileage in the district is restricted, of which 50% is coincident with intervals of excessive high degree of curvature. Traffic volumes are about 4% less than the average for this type of surfacing in the district.

4. Plain Macadam

Approximately 56% of the total mileage for the district is restricted, of which 66% is coincident with intervals of high degree of curvature. Traffic volumes are 26% greater in these intervals of restricted sight distance than the average for the district.

5. Plain Gravel

Approximately 79% of the total mileage is restricted, of which 86.5% is coincident with intervals of excessive curvature. Traffic volumes are reduced about 13.5%.

6. Graded and Drained

Approximately 59% of the total mileage is restricted, of excessive curvature. Traffic volumes are reduced about 7%.

7. All Types

Approximately 38.6% of the total improved mileage in the district is restricted, of which 50.5% is coincident with excessive curvature. Of the total restricted mileage coincident with excessive curvature, 44.8% is found on the National Forest Highway System. Traffic volume over the district is reduced about 14%.

B. Non-mountainous District

1. Bituminous Macadam

No sight restrictions of excessive high degree.

2. Concrete

No sight restrictions of excessive high degree.

3. High Type Bituminous Surfacing

Approximately 35% of the total mileage is restricted, of which 69% is coincident with intervals of excessive high degree of curveture. The traffic volumes are reduced about 18%.

4. Low Type Bituminous Surfacing

Approximately 35% of the total mileage is restricted, of which 51% is coincident with intervals of excessive high degree of curvature. The traffic is approximately 10% greater than the average for the district.

5. Plain Macadam

Approximately 68% of the mileage is restricted, of which 36% is coincident with intervals of excessive curvature. Traffic volumes along the restricted intervals are 2% greater than the average for the district.

6. Plain Gravel

No sight restrictions in the district.

7. Graded & Drained

No excessive high degree of sight restriction in the district.

8. All Types

Approximately 36.2% of the total improved mileage in the district is restricted, of which 52% is coincident with intervals of excessive curvature. Traffic volumes for practical purposes remain unchanged.

2.11 Steep Grades on Federal Aid System

Criteria assigned during the course of the Rural Road Inventory Survey designated 8% or greater as an excessive gradient in the mountainous district, 5% or greater in the non-mountainous district. As a consequence, we have no excessive steep grades on the Federal Aid System in the western or mountainous district. Table 33, as follows, sets forth intervals of high gradient in the eastern or non-mountainous district.

Table 33

EXCESSIVE GRADES - FEDERAL AID SYSTEM

In Non-mountainous District

Counties and Districts	Total Mileage	5% - 8%				Over 8%				Total			
		No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.
Blaine													
High Type Bit.	18.6	1	5	0.1	0.5					1	5	0.1	0.5
Low Type Bit.	32.1												
Plain Gravel	3.4												
All Types	54.1	1	2	0.1	0.2					1	2	0.1	0.2
Glacier													
High Type Bit.	15.3	4	26	0.4	2.6					4	26	0.4	2.6
Low Type Bit.	111.4	20	18	5.0	4.5					20	18	5.0	4.5
Plain Macadam													
All Types	126.7	24	19	5.4	4.3					24	19	5.4	4.3
Hill													
High Type Bit.	22.4	4	18	0.6	2.7					4	18	0.6	2.7
Low Type Bit.	58.5												
All Types	80.9	4	5	0.6	0.7					4	5	0.6	0.7
Liberty													
High Type Bit.	11.0												
Low Type Bit.	13.7												
All Types	24.7												
Toole													
High Type Bit.	15.6												
Low Type Bit.	71.1	11	15	3.1	4.4					11	15	3.1	4.4
All Types	86.7	11	13	3.1	3.6					11	13	3.1	3.6
Sub-Total Dist. #2													
High Type Bit.	82.9	1	11	1.1	1.3					9	11	1.1	1.3
Low Type Bit.	286.8	31	11	8.1	2.8					31	11	8.1	2.8
Plain Macadam													
Plain Gravel	3.4												
All Types	373.1	40	11	9.2	2.5					40	11	9.2	2.5
Daniels													
Low Type Bit.	46.9	18	37	2.8	6.0					18	37	2.8	6.0
All Types	46.9	18	37	2.8	6.0					18	37	2.8	6.0
Phillips													
High Type Bit.	24.7												
Low Type Bit.	28.8												
All Types	53.5												
Roosevelt													
High Type Bit.	0.7												
Low Type Bit.	144.8	29	20	4.6	3.2					29	20	4.6	3.2
All Types	145.5	29	20	4.6	3.2					29	20	4.6	3.2
Sheridan													
High Type Bit.	12.0												
Low Type Bit.	40.4	2	5	0.6	1.5					2	5	0.6	1.5
Plain Macadam	10.1												
All Types	62.5	2	3	0.6	1.0					2	3	0.6	1.0
Valley													
High Type Bit.	20.4	1	5	0.4	2.0					1	5	0.4	2.0
Low Type Bit.	77.3	10	13	1.6	2.0	2	3	0.2	0.3	12	16	1.8	2.3
All Types	97.7	11	11	2.0	2.0	2	2	0.2	0.2	13	13	2.2	2.2
Sub-Total Dist. #3													
High Type Bit.	57.8	1	2	0.4	0.7					1	2	0.4	0.7
Low Type Bit.	338.2	59	17	9.6	2.8	2	1	0.2	0.1	61	18	9.8	2.9
Plain Macadam	10.1												
All Types	406.1	60	15	10.0	2.5	2	-	0.2	-	62	15	10.2	2.5
Dawson													
Concrete	0.3												
High Type Bit.	20.4	1	5	0.1	0.5					1	5	0.1	0.5
Low Type Bit.	83.5	4	5	0.5	0.6					4	5	0.5	0.6
All Types	104.2	5	5	0.6	0.6					5	5	0.6	0.6
McCone													
Low Type Bit.	41.9	5	12	0.6	1.5					5	12	0.6	1.5
Plain Macadam	15.0	1	7	0.5	3.3					1	7	0.5	3.3
All Types	56.9	6	11	1.1	1.9					6	11	1.1	1.9
Prairie													
Low Type Bit.	28.4	1	4	0.1	0.4					1	4	0.1	0.4
All Types	28.4	1	4	0.1	0.4					1	4	0.1	0.4
Richland													
High Type Bit.	13.8												
Low Type Bit.	34.0	3	9	0.6	1.8					3	9	0.6	1.8
Plain Macadam	7.9												
All Types	55.7	3	5	0.6	1.1					3	5	0.6	1.1
Wibaux													
High Type Bit.	10.9												
Low Type Bit.	2.3												
All Types	13.2												
Sub-Total Dist. #4													
Concrete	0.3												
High Type Bit.	46.1	1	2	0.1	0.2					1	2	0.1	0.2
Low Type Bit.	190.1	13	7	1.8	0.9					13	7	1.8	0.9
Plain Macadam	22.9	1	4	0.5	2.2					1	4	0.5	2.2
All Types	258.4	15	6	2.4	0.9					15	6	2.4	.9

Table 33 (Continued)

Counties and Districts	Total Mileage	5% - 8%				Over 8%				Total			
		No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.
Fergus													
Concrete	1.2												
High Type Bit.	33.0	4	12	1.6	4.9					4	12	1.6	4.9
Low Type Bit.	46.4	18	39	4.8	10.3					18	39	4.8	10.3
Plain Macadam	34.4	12	35	2.5	7.3					12	35	2.5	7.3
All Types	115.0	34	30	8.9	7.7					34	30	8.9	7.7
Garfield													
Low Type Bit.	60.4	5	8	0.9	1.5					5	8	0.9	1.5
Plain Macadam	53.2	12	23	1.5	2.8					12	23	1.5	2.8
Graded & Drained	21.9	4	18	0.5	2.3					4	18	0.5	2.3
All Types	135.5	21	16	2.9	2.1					21	16	2.9	2.1
Petroleum													
Low Type Bit.	40.1	8	20	2.0	5.0					8	20	2.0	5.0
All Types	40.1	8	20	2.0	5.0					8	20	2.0	5.0
Sub-Total Dist. #5													
Concrete	1.2												
High Type Bit.	33.0	4	12	1.6	4.9					4	12	1.6	4.9
Low Type Bit.	146.9	31	21	7.7	5.2					31	21	7.7	5.2
Plain Macadam	87.6	24	27	4.0	4.6					24	27	4.0	4.6
Graded & Drained	21.9	4	18	0.5	2.3					4	18	0.5	2.3
All Types	290.6	63	22	13.8	4.7					63	22	13.8	4.7
Cascade													
Block, other than brick	2.9												
Concrete	0.1												
High Type Bit.	2.6	1	39	0.1	3.9					1	39	0.1	3.9
Low Type Bit.	101.5	14	14	3.6	3.6								
Plain Macadam													
All Types	107.1	15	14	3.7	3.5					15	14	3.7	3.5
Chouteau													
Low Type Bit.	71.3	2	3	0.4	0.6					2	3	0.4	0.6
All Types	71.3	2	3	0.4	0.6					2	3	0.4	0.6
Judith Basin													
High Type Bit.	18.7	5	27	1.0	5.4					5	27	1.0	5.4
Low Type Bit.	38.7	6	15	1.2	3.1					6	15	1.2	3.1
All Types	57.4	11	19	2.2	3.8					11	19	2.2	3.8
Pondera													
Low Type Bit.	52.2	5	10	1.6	3.1	1	2	0	0	6	12	1.6	3.1
All Types	52.2	5	10	1.6	3.1	1	2	0	0	6	12	1.6	3.1
Teton													
High Type Bit.	0.6												
Low Type Bit.	90.9	10	11	3.4	3.7					10	11	3.4	3.7
All Types	91.5	10	11	3.4	3.7					10	11	3.4	3.7
Sub-Total Dist. #6													
Block, other than brick	2.9												
Concrete	0.1												
High Type Bit.	21.9	6	27	1.1	5.0					6	27	1.1	5.0
Low Type Bit.	354.6	37	10	10.2	2.9	1	1	0	0	38	11	10.2	2.9
All Types	379.5	43	11	11.3	3.0	1	1	0	0	44	12	11.3	3.0
Lewis & Clark													
High Type Bit.	0.3	1	333	0.1	33.3					1	333	0.1	33.3
Low Type Bit.	4.3	2	47	0.7	16.3					2	47	0.7	16.3
All Types	4.6	3	65	0.8	17.4					3	65	0.8	17.4
Sub-Total Dist. #7													
High Type Bit.	0.3	1	333	0.1	33.3					1	333	0.1	33.3
Low Type Bit.	4.3	2	47	0.7	16.3					2	47	0.7	16.3
All Types	4.6	3	65	0.8	17.4					3	65	0.8	17.4
Park													
High Type Bit.	18.7	1	5	0.2	1.1					1	5	0.2	1.1
All Types	18.7	1	5	0.2	1.1					1	5	0.2	1.1
Sweet Grass													
High Type Bit.	36.4												
All Types	36.4												
Wheatland													
Low Type Bit.	44.4	2	5	0.2	0.5					2	5	0.2	0.5
All Types	44.4	2	5	0.2	0.5					2	5	0.2	0.5

Table 33 (Continued)

Counties and Districts	Total Mileage	5% - 8%				Over 8%				Total			
		No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.	No.	No. Per 100 Mi.	Length	Length Per 100 Mi.
Sub-Total Dist. #10													
High Type Bit.	55.1	1	2	0.2	0.4					1	2	0.2	0.4
Low Type Bit.	44.4	2	5	0.2	0.5					2	5	0.2	0.5
All Types	99.5	3	3	0.4	0.4					3	3	0.4	0.4
Big Horn													
Low Type Bit.	78.5	2	3	0.3	0.4					2	3	0.3	0.4
Graded & Drained	8.1												
All Types	86.6	2	2	0.3	0.4					2	2	0.3	0.4
Carbon													
High Type Bit.	4.2												
Low Type Bit.	84.8	1	1	0.1	0.1					1	1	0.1	0.1
All Types	89.0	1	1	0.1	0.1					1	1	0.1	0.1
Golden Valley													
High Type Bit.	16.1	1	6	0.1	0.6					1	6	0.1	0.6
Low Type Bit.	12.0	1	8	0.1	0.8					1	8	0.1	0.8
All Types	28.1	2	7	0.2	0.7					2	7	0.2	0.7
Musselshell													
Low Type Bit.	63.1	11	17	2.5	4.0					11	17	2.5	4.0
Graded & Drained	33.6	2	6	0.5	1.5					2	6	0.5	1.5
All Types	96.7	13	13	3.0	3.1					13	13	3.0	3.1
Stillwater													
High Type Bit.	38.1	8	21	1.4	3.7					8	21	1.4	3.7
All Types	38.1	8	21	1.4	3.7					8	21	1.4	3.7
Treasure													
High Type Bit.	28.7	8	28	3.2	11.2					8	28	3.2	11.2
All Types	28.7	8	28	3.2	11.2					8	28	3.2	11.2
Yellowstone													
Concrete	0.2												
High Type Bit.	10.3												
Low Type Bit.	118.2	13	11	1.8	1.5					13	11	1.8	1.5
All Types	128.7	13	10	1.8	1.4					13	10	1.8	1.4
Sub-Total Dist. #11													
Concrete	0.2												
High Type Bit.	97.4	17	17	4.7	4.8					17	17	4.7	4.8
Low Type Bit.	356.6	28	8	4.8	1.3					28	8	4.8	1.3
Graded & Drained	41.7	2	5	0.5	1.2					2	5	0.5	1.2
All Types	495.9	47	9	10.0	2.0					47	9	10.0	2.0
Carter													
Low Type Bit.	38.4	3	8	0.3	0.8					3	8	0.3	0.8
Plain Macadam	11.6												
All Types	50.0	3	6	0.3	0.6					3	8	0.3	0.6
Custer													
High Type Bit.	27.4	8	29	1.6	5.8					8	29	1.6	5.8
Low Type Bit.	133.1	14	11	3.7	2.8					14	11	3.7	2.8
All Types	160.5	22	14	5.3	3.3					22	14	5.3	3.3
Fallon													
High Type Bit.	3.4												
Low Type Bit.	26.9	4	15	0.4	1.5					4	15	0.4	1.5
Plain Macadam	37.0	7	19	1.0	2.7					7	19	1.0	2.7
All Types	67.3	11	16	1.4	2.1					11	16	1.4	2.1
Powder River													
Low Type Bit.	47.3	8	17	1.6	3.4					8	17	1.6	3.4
Graded & Drained	24.2	6	25	1.8	7.4					6	25	1.8	7.4
All Types	71.5	14	20	3.4	4.8					14	20	3.4	4.8
Rosebud													
High Type Bit.	25.5	11	43	2.3	9.0					11	43	2.3	9.0
Low Type Bit.	33.5												
Plain Macadam	12.7												
All Types	71.7	11	15	2.3	3.2					11	15	2.3	3.2
Sub-Total Dist. #12													
High Type Bit.	56.3	19	34	3.9	6.9					19	34	3.9	6.9
Low Type Bit.	279.2	29	10	6.0	2.2					29	10	6.0	2.2
Plain Macadam	61.3	7	11	1.0	1.6					7	11	1.0	1.6
Graded & Drained	24.2	6	25	1.8	7.4					6	25	1.8	7.4
All Types	421.0	61	14	12.7	3.0					61	14	12.7	3.0
Grand Totals													
Block, other than brick	2.9												
Concrete	1.8												
High Type Bit.	449.8	99	13	13.2	2.9	3		0.2		99	13	13.2	2.9
Low Type Bit.	2001.1	232	12	49.1	2.5	3		0.2		235	12	49.3	2.5
Plain Macadam	181.9	32	18	5.5	3.0					32	18	5.5	3.0
Plain Gravel	3.4												
Graded & Drained	87.8	12	14	2.8	3.2					12	14	2.8	3.2
All Types	2728.7	335	12	70.6	2.6	3		0.2		338	12	70.8	2.6

Assuming a length of 2,000 feet to be critical, we find excessive steep grades 5% or over to be located as follows:

*-Coincident with intervals of excessive high degree of curvature or excessive high degree of sight restriction.

Table 34

LOCATION OF EXCESSIVE GRADES ON FEDERAL AID SYSTEM
In Non-mountainous District
Excessive Grades - In excess of 5% and 2,000 feet or more in length occurring at the rate of one or more per 100 miles.

County	F. A. Route No.	Project No.	Surface Types: Concrete Mi.	Concrete Rate	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Rate	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Rate	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Rate	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Rate	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Rate	Graded & Drained Tr.	All Types Mi.	All Types Rate	All Types Tr.
Glacier	x	227A*							3.0	67	134										3.0	67	134
		190*							5.0	20	169										5.0	20	169
									8.0	38	156										8.0	38	156
Toole	1	62A				15.6		195	11.8	8	292										27.4	4	234
						15.6		195	11.8	8	292										27.4	4	234
	21	67A*							6.3	32	332										6.3	32	332
									6.3	32	332										6.3	32	332
Roosevelt	1	84F*							3.5	29	281										3.5	29	281
									3.5	29	281										3.5	29	281
	22	273A*							2.4	42	101										2.4	42	101
									2.4	42	101										2.4	42	101
Sheridan	22	251C							11.5	9	148										11.5	9	148
									11.5	9	148										11.5	9	148
Valley	42	315A				14.6	7	1827													14.6	7	1827
						14.6	7	1827													14.6	7	1827
McCone	15	247D										7.8	13	10							7.8	13	10
												7.8	13	10							7.8	13	10
Fergus	15	229A*				3.9	26	359													3.9	26	359
						3.9	26	359													3.9	26	359
	16	28*							2.4	42	162										2.4	42	162
									2.4	42	162										2.4	42	162
Petroleum	16	28*							4.9	20	174										4.9	20	174
									4.9	20	174										4.9	20	174
Cascade	11	64A*							16.6	42	624										16.6	42	624
									16.6	42	624										16.6	42	624
Teton	3	151*							13.2	15	147										13.2	15	147
									13.2	15	147										13.2	15	147
	9	275A							10.0	10	74										10.0	10	74
									10.0	10	74										10.0	10	74
Treasure	2	160D*				17.7	28	398													17.7	28	398
						17.7	28	398													17.7	28	398
Custer	2	86D							10.1	10	266										10.1	10	266
									10.1	10	266										10.1	10	266
Powder River	23	198A*							3.5	29	119										3.5	29	119
									3.5	29	119										3.5	29	119
	37	FH 53A*																5.2	58	15	5.2	58	15
Rosebud	2	135B*				6.1	16	436													6.1	16	436
						6.1	16	436													6.1	16	436
	1					15.6		195	15.3	13	289										30.9	6	242
	2					23.8	25	408	10.1	10	266										33.9	21	366
	3								21.2	24	150										21.2	24	150
	9								10.0	10	74										10.0	10	74
	11								16.6	42	624										16.6	42	624
	15					3.9	26	359				7.8	13	10							11.7	17	126
	16								7.3	27	170										7.3	27	170
	21								6.3	32	332										6.3	32	332
	22								13.9	15	140										13.9	15	140
	23								3.5	29	119										3.5	29	119
	37																	5.2	58	15	5.2	58	15
	42					14.6	7	1827													14.6	7	1827
Non-mountainous District						57.9	14	705	104.2	22	260	7.8	13	10				5.2	58	15	175.1	20	389
Coincident with Excessive Curvature						27.7	25	402	54.9	28	322										82.6	27	348
Coincident with Excessive Sight Restriction									5.9	34	136							5.2	58	15	11.1	45	75
No Excessive Curvature or Sight Restriction						30.2	3	985	43.4	9	197	7.8	13	10							81.4	7	471

We find from the tabulation and associated inventory data that of the total mileage bearing excessively high gradients, 47% has excessively high curvature (over 6°). 6% is restricted by limited sight distances and 47% has neither excessive curvature nor limited sight distances.

2.12--Heavy Traffic Highway Intersections

Table 35 following immediately hereafter presents information regarding the location of critical heavy-traffic intersections. It is presumed that a volume of 300 or more vehicles per 24 hour day on the lesser entering road determines the critical limit. Under these conditions, we find the Federal Aid System furnishes 14 entering roads in the lesser volume classifications, the State Secondary System furnishes three, the Land Service System one. All these roads enter upon sections of the Federal Aid System with the greater traffic volumes.

"Stop" signs are in use on all the entering roads, and, since in most cases the intersections are near municipalities where restricted speeds are in effect, there are no great hazards extent. Sight distances are adequate in all instances, hence safety features of the highway systems are well provided. Details respecting the location of heavy traffic interesections are as follows:

TABLE 35
CRITICAL RURAL HIGHWAY INTERSECTIONS CLASSIFIED BY SYSTEM DESIGNATION AND TRAFFIC VOLUMES

County	Average traffic per 24 hour day on the road carrying the lesser volume of vehicles.	Average traffic per 24 hour day on road carrying the greater volume of vehicles			
		500-999	1000-1499	1500-1999	2000-2999
Lake	300-499 FA #6	FA #5			
Deweon	300-499 FA #20	FA #15			
Cascade	500-999 FA #3		FA #3		
Cascade	300-499 Sand Coulee Road	FA #11			
Cascade	500-999 FA #10				FA #10
Lewis & Clark	500-999 FA #3				FA #3
Missoula	500-999 FA #2		FA #2		
Missoula	500-999 FA #24			FA #2	
Powell	300-499 FA #8	FA #2			
Deer Lodge	300-499 Warm Springs Cut Off			FA #19	
Deer Lodge	300-499 Warm Springs Cut Off	FA #2			
Deer Lodge	500-999 FA #2		FA #2		
Silver Bow	300-499 FA #3				FA #2
Park	500-999 FA #11				FA #2
Park	300-499 FA #11				FA #2
Musselshell	300-499 FA #14	FA #14			
Yellowstone	300-499 FA #16		FA #2		
Yellowstone	500-999 Cemetery Road				FA #2
	300-499 Federal Aid 7	4	1		2
	Other Syeteme 3	2		1	
	500-999 Federal Aid 7		3	1	3
	Other Systeme 1				1
	All Roads 18	6	4	2	6

2.13--Railroad Grade Crossings

The elimination of railroad grade crossings along our several highway systems is a problem of great consequence as the road programs approach primary stages of completion. Costs engendered in any program of grade crossing elimination are of considerable magnitude. Consequently, allocations are dependent on provision of an adequate funding program which should obviously be expended in the principal interest of accident prevention. By virtue of certain findings of the road inventory survey, we are enabled to present some few significant facts concerning the problem of administrating this phase of highway engineering. However, no concise engineering formula respecting a hazard rating can be developed at this time with the data at hand. The Public Roads Administration contemplates additional study along these lines and no doubt they will introduce a logical and rational pro edure in connection with grade crossing elimination in the near future.

Railroad grade crossings exist as follows at the present time:

Table 36A

RAILROAD GRADE CROSSINGS ON THE FEDERAL AID SYSTEM;
CLASSIFIED BY TYPE OF PROTECTION, ROADWAY APPROACH GRADIENT,
CLEAR VIEW, MOTOR VEHICLE TRAFFIC AND RAILROAD TRAFFIC,

County	Railroad	Signs Only																														TOTAL
		Steepest roadway approach road less than 7%. Shortest clear view along railroad from point on roadway 300' removed.										24-hour Annual Average Traffic Volume														Average Daily Railroad Traffic						
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 Over	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 Over	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	
Flathead	G.N.		1		1								1						1								2					2
Lake	Privately Owned				1									1													1					1
Lincoln	G.N.	1															1										1					1
Sub-Total Dist. #1		1	1		2								1	1			1	1									4					4
Blaine	G.N.	1		2	1	1		2									1	3	3							3				4		7
Hill	G.N.							1								1												1				1
Sub-Total Dist. #2		1		2	1	1		3								1	1	3	3							3		1		4		8
Daniels	G.N.	1									1		1		1												2					2
"	M.St.P.&St.M.		1										1														1					1
Phillips	G.N.						1	2								3											3					3
Roosevelt	G.N.										3		1	1			1										2			1		3
Sub-Total Dist. #3		1	1				1	2			4		3	1	1	3	1										4	4		1		9
Dawson	N.P.		2	1											2						1						2	1				3
Richland	G.N.						1										1										1					1
"	N.P.										1			1														1				1
Wibaux	G.N.							1						1													1					1
"	Mont. West			1												1											1					1
Sub-Total Dist. #4			2	2			1	1			1			2	2	1	1										5	2				7
Fergus	C.M. & St.P.			3	1	1		1				2		2			2										4	1	1				6
Sub-Total Dist. #5				3	1	1		1				2		2			2										4	1	1				6
Cascade	C.M. & St.P.							1			1				1						1						2						2
"	G.N.		1				1	2		1			1	1			1	1							1			4	1				5
Teton	C.M. & St.P.				1	1	1							2	1												3					3
"	G.N.	1		1										2														2				2
Sub-Total Dist. #6		1	1	1	1	1	2	3		1	1		1	5	2		1	1			1				1		5	6	1				12
Jefferson	G.N.										2						1	1									2						2
Lewis & Clark	G.N.	2						1					2			1											2	1					3
Sub-Total Dist. #7		2						1			2		2			1	1	1									4	1					5
Granite	N.P.										1			1													1						1
Mineral	N.P.	1			1												2										1	1					2
Missoula	C.M. & St.P.	1		1	1													2			1						3						3
"	N.P.			1							2						1				2						2	1					3
Ravalli	N.P.		1												1												1						1
Sanders	Privately Owned			1												1											1						1
"	N.P.	1		1									1		1												1			1			2
Sub-Total Dist. #8		3	1	4	2						3		1	1	2	1	3	2			3						4	7	1	1			13
Beaverhead	U.P.										1		1														1						1
"	G. & P.				1						1			2													2						2
Deer Lodge	B.A. & P.		1		1																2									2			2
Madison	N.P.	2	3								1		3	1	2												6						6
Silver Bow	B.A. & P.	1									2												2	1		1	1	1					3
" "	N. P.			1																1						1							1
Sub-Total Dist. #9		3	4	1	2						5		4	3	2					1	2		2	1		2	10	1	2				15
Gallatin	C.M. & St.P.							2												2							2						2
"	N.P.			1	1						1									2	1						2	1					3
Park	N.P.										1			1													1						1
Meagher	W.S.S. & Y.P.										1		1														1						1
Sub-Total Dist.#10				1	1			2			3		1	1						4	1						1	5	1				7
Big Horn	C.B. & Q.										3									2	1						2	1					3
Carbon	M.W. & S.										1									1							1						1
"	N.P.		2	1							3					2	1	1	1	1							1	5					6
Musselshell	C.M. & St.P.		1				1													1		1					2						2
Yellowstone	N.P.		2	1		1					3						2				2	1	1	1			1	4		1	1		7
Sub-Total Dist.#11			5	2		1	1				10					2	3	1	1	5	3	2	1	1			6	11		1	1		19
Rosebud	N.P.				1											1												1					1
Sub-Total Dist.#12					1											1												1					1
STATEWIDE		12	15	16	11	4	4	13	-	1	29	2	13	10	9	10	14	9	4	9	4	9	1	3	2	28	9	4	1	1	5	105

Table 36A (Continued)

County	Railroad	Steepest roadway approach road less than 7%. Shortest clear view along railroad from point of roadway 300' removed.										Motor Vehicle Volume Group														Railroad Traffic						TOTAL
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	
No Warning Signs or Signals																																
Broadwater	N. P				1											1										1						1
Beaverhead	G. & P.							1						1													1					1
Statewide					1			1						1		1										1	1					2
Lights Stationary																																
Missoula	N. P.										1													1		1						1
Gallatin	N. P.										1										1									1		1
Meagher	C. M. St. P. & P.										1			1														1				1
Statewide											3			1							1			1		1	1	1				3
Lights Flashing																																
Lewis & Clark	G. N.	1												1													1					1
Roosevelt	G. N.										1	1																			1	1
Toole	G. N.			1												1											1					1
Powell	N. P.		1															1												1		1
Sanders	N. P.										1				1												1					1
Statewide		1	1	1							2	1		1	1	1		1									3			1	1	5
Lights and Bells																																
Gallatin	C. M. St. P. & P.										1				1																	1
Custer	N. P.							1											1												1	1
Broadwater	N. P.			1												1													1			1
Granite	C. M. St. P. & P.	1													1														1			1
Granite	N. P.		1												1																1	1
Statewide		1	1	1				1			1				3	1			1								1	2	2			5
Wigwag and Lights																																
Gallatin	N. P.							1							1												1					1
Statewide								1							1												1					1
Wigwag Lights and Bells																																
Deer Lodge	N. P.							1													1						1					1
Statewide								1													1						1					1

Table 36A (Continued)

County	Railroad	Signs Only																														TOTAL
		Steepest roadway approach road 7% or more. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Groups												Railroad Traffic								
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 & Over	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over	
Musselshell	C. M. & St. P.						1															1		1								1
Dietriot #11							1															1		1								1
Statewide							1															1		1								1
STATEWIDE - All Crossings		14	17	18	12	4	5	17	-	1	35		2	16	21	12	10	15	10	4	10	6		31	59	16	6	5	6	-	-	123

1 @ 25 - 49
9 @ 1000 - 1249
2 @ 1250 - 1499
3 @ 1500 - 1999
2 @ 2000 & Over

Table 36B

RAILROAD GRADE CROSSINGS ON THE STATE SECONDARY SYSTEM,

CLASSIFIED BY TYPE OF PROTECTION, ROADWAY APPROACH GRADIENT,

CLEAR VIEW, MOTOR VESICLE TRAFFIC AND RAILROAD TRAFFIC

County	Railroad	Signs Only: Steepest roadway approach road less than 7%. Shortest clear view along railroad from point on roadway 300' removed. Motor Vehicle Volume Group: 0-9	10-24	25-49	50-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799	800-899	900-999	1000-1249	1250-1499	Railroad Traffic: 0-1	2-4	5-8	9-13	14-19	20-28	TOTAL
		0-49	50-149	150-249	250-349	350-449	450-749	750-1049	1050-1449	1450-1949	1950 & Over													
Roosevelt	G. N.										2			2									2	2
Sheridan	M. St. P. & St.M							1							1				1					1
District #3								1			2			2	1				1				2	3
Prairie	N. P.										1			1							1			1
District #4											1			1							1			1
Fergus	C.M. & St. P.		1	1	1							1			2			2		1				3
District #5			1	1	1							1			2			2		1				3
Pondera	Mont. West.		1											1				1						1
Teton	G. N.		1											1				1						1
District #6			2											2				2						2
Lewis & Clark	O. N.	1				1								2				2						2
District #7		1				1								2				2						2
Beaverhead	G. & P.										1			1				1						1
Deer Lodge	S.A. & P.										2			2					2					2
Deer Lodge	N. P.				1									1					1					1
Silver Sow	C. M. & St.P.		1			1								1		1		1		1				2
Silver Sow	U. P.	1												1					1					1
District #9		1	1		1	1					3			4	2	1		2	2	3				7
Wheatland	C. M. & St.P.							1							1				1					1
District #10								1							1				1					1
Sig Horn	C. B. & Q.										2				2			2						2
Carbon	M. W. & S.		1								1				1	1		2						2
Yellowstone	N. P.										1		1								1			1
District #11			1								4		1		3	1		4			1			5
Fallon	C. M. & St. P.							1					1							1				1
Rosebud	N. P.						1				2			2	1			3						3
District #12							1	1			2		1	2	1			3		1				4
STATEWIDE		2	5	1	2	1	2	3			12	1	2	4	8	11	1						1	28
		Lights Stationary																						
Sandere	N. P.					1									1							1		1
STATEWIDE						1									1							1		1
		Lights Flashing																						
Lewis & Clark	G. N.	1												1				1						1
Deer Lodge	N. P.							1								1			1					1
STATEWIDE		1						1						1		1		1	1					2

Table 36B (Continued)

County	Railroad	Signs Only: Steepest roadway approach road 7% or more. Shortest clear view along railroad from point on roadway 300' removed. Motor Vehicle Volume Groups: 0-9	10-24	25-49	50-99	100-199	200-299	300-399	400-499	500-599	Railroad Traffic: 0-1	2-4	5-8	9-13	14-19	20-26	27-34	35 & Over	TOTAL
		0-49	50-149	150-249	250-349	350-449	450-749	750-1049	1050-1449	1450-1949	1950 & Over														
Fergus	C. M. & St.P.						1						1								1				1
Chouteau	G. N.	1														1					1				1
Carbon	M.W. & S.		1			1	1								1	1	1				3				3
Stillwater	N. P.			1											1						1				1
STATEWIDE		1	1	1	-	1	2						1		1	1	1	2			2	3	1		6
STATEWIDE All Crossings		4	6	2	2	3	4	4	-	-	12	1	3	4	10	12	2	3	1	-	2	16	9	5	3	2	-	-	37

1 @ 1250-1499

Table 36C

RAILROAD GRADE CROSSINGS ON THE LAND SERVICE SYSTEM, CLASSIFIED BY TYPE OF PROTECTION

ROADWAY APPROACH GRADIENT, CLEAR VIEW, MOTOR VEHICLE TRAFFIC AND RAILROAD TRAFFIC.

County	Railroad	Signs Only																										TOTAL
		Steepest roadway approach road less than 7%. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Group										Railroad Traffic								
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over	
Flathead	G. N.	4	2	6		2	6	1			8	9	7	3	4	5		1				2	14		8	4			1	29
Lake	Pri. Owned	1	1	2			1	1			2	1	4	1	1	1						4	4							8
Lake	N. P.	3	3	3		1	3	4	1		8	8	10	3	3	2							22	4						26
Lincoln	Pri. Owned	2	1										1	1	1								3							3
Lincoln	G. N.	1	4	5	2		1			1		4	4	3	2	1						2			1	10	1			14
District #1		11	11	16	2	3	11	6	1	1	18	22	26	11	11	9		1				8	43	4	9	14	1		1	80
Blaine	G. N.	1	2	1	1	3	9	4			7	15	4	2	6	1							15				13			28
Glacier	G. N.	1	1	2	1	1	1	2		1	2	2	2	4	2	1		1								10	1	1		12
Hill	G. N	1	1	2	2	3	1	14		1	7	20	7		1	3	1							3	21	2	1			32
Liberty	G. N.	1		2	4	2	6	2				9	6	1		1									16	1				17
Toole	G. N.	1	1	2	1	1	1	3	1	2	10	13	5	1	2	2						1	6		11	5				23
District #2		5	5	9	9	10	18	25	1	4	26	59	24	8	11	8	1	1				1	21	8	48	18	15	1		112
Daniels	G. N.		1	1	2	1	1	3		1	13	3	7	4	6	3							23							23
Daniels	M.St.P.MSt.M.			2		1								3										3						3
Phillips	G. N.	2	3	1			4	4			7	10	5	3	3								8	4				9		21
Roosevelt	G. N.	4	2			1	1				18	15	5	3	3								15				11			26
Sheridan	G. N.		1				1				13	7	3	2	2		1						15							15
Sheridan	M.St.P.S.St.M.	2	2	1	2		1	2	1		7	9	3	3	3									18						18
Valley	G. N.	2	1	1	2	1	2	3			6	2	6	6	4								4				14			18
District #3		10	10	6	6	4	10	12	1	1	64	46	29	24	21	3	1						65	25			25	9		124
Dawson	G. N.		1	1							2	2			1	1							4							4
Dawson	N. P.	2	1	3			2				10	12	2	3	1								5	11	2					18
McCone	N. P.							1			3	2	1		1									4						4
Prairie	C.M. & St.P.			1							2	1		1		1								3						3
Prairie	N. P.					1					2	2				1							3							3
Richland	G. N.	2	1		2						16	8	6	6	1							1	10	10						21
Richland	N. P.	1	1								9	2	1	5	1	2							8	3						11
Wibaux	N. P.	1	1								7	6	1			1			1				1		8					9
District #4		6	5	5	2	1	2	1			51	35	11	15	5	6			1			1	31	31	10					73
Fergue	C.M. & St.P.	2	3	4	2	5	16	19			14	29	8	12	6	7	1			2		14	16	35						65
Fergus	G. N.	1		1	1	1	5	3				4	2	2	1	3							10	2						12
Petroleum	C.M. & St.P.							1				1											1							1
District #5		3	3	5	3	6	21	23			14	34	10	14	7	10	1			2		14	27	37						78
Cascade	C.M. & St.P.			1			1	1		3	2	1	4	2	1							5		3						8
Cascade	G. N.	5	18	3	1		1			6	12	10	12	11	2	2	8	1				1	29	6	8		7			46
Chouteau	G. N.		1	1			3	4			3	9	1	1	1									12						12
Judith Basin	C.M. & St.P.				1			1			4	5		1										6						6
Judith Basin	G. N.			2	2	2	11	8		2	8	16	8	7	4								9	9	14	3				35
Pondera	G. N.		2	2	1		2	2			2	2	5	2	1	1							11							11
Pondera	Mont. West.	1		3	2		5	2				5	1	5	2								13							13
Teton	C.M. & St.P.		2		3		2	5				2	2	6	2							12								12
Teton	G. N.	2	3	3	1	2	3	3				8	3	5		1							17							17
District #6		8	26	15	11	4	28	26		11	31	58	36	40	13	4	8	1				18	79	36	17	3	7			160
Broadwater	C.M. & St.P.						1					1												1						1
Broadwater	N. P.										3	1	1	1		2											3			3
Jefferson	C.M. & St.P.				1						2		1											1	2					3
Jefferson	G. N.	5	2				2				4	7	2	3	1									13						13
Jefferson	N. P.	2	3								4	1	2	2	1	3							5	4						9
Lewis & Clark	G. N.	3	1		2		2	3				3	2	3	2	1							9	2						11
Lewis & Clark	N. P.	3	6			1					2		1	5	3	2	1					4					8			12
District #7		13	12		3	1	5	3			15	13	9	14	7	8	1					4	14	21	2		11			52

Table 36C (Continued)

County	Railroad	Signs Only																													TOTAL
		Steepest roadway approach road less than 7%. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Group										Railroad Traffic									
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over	
Granite	C.M. & St.P.	2	1									3													3					3
Granite	N. P.	2	3					1			1		1	6								1	5			1					7
Mineral	C.M. & St.P.		2	1							1	2	2												4					4
Mineral	N. P.	3	4	2			1				3	6	3	4								1	4	8						13
Missoula	C.M. & St.P.	5			1		1				10	6		6	4	1						8			9					17
Missoula	N. P.	2	1	1	1						16	8	4	6	1	1				1			4	2	9	6				21
Powell	C.M. & St.P.	4			1		1	1					2	1	3	1									7					7
Powell	N. P.	5	2	2	2	1	2	1				2	5	2	5	1						2	6		7					15
Ravalli	N. P.	4	6	3	1	1		2			16	8	7	6	3	6	3					1	32							33
Sanders	Pri. Owned		2									2											2							2
Sanders	N. P.	3	1	1			3				4	6	1		2	2	1						2	2	7	1				12
District #8		30	22	10	6	2	8	5			51	43	25	31	18	12	4			1		13	55	12	46	8				134
Beaverhead	U. P.	1	2								10	8	3	1	1									11	2					13
Beaverhead	G. & P.										2	1	1										2							2
Deer Lodge	B. A. & P.	1	1	1	1			1					1	3		1							3		2					5
Deer Lodge	C.M. & St.P.				1									1											1					1
Deer Lodge	N. P.	1	1		1								1		2									3						3
Madison	C.M. & St.P.	1														1								1						1
Madison	N. P.	7	7	2	3		2				8	6	6	7	3	6		1				29								29
Silver Bow	B. A. & P.	3					1	1			2	1		1	1	4								1	4	2				7
" "	C.M. & St.P.		1								4	1	2	1		1									5					5
" "	N. P.	3		1			2				5		2	4		4						4		2	5					11
Silver Bow	U. P.	1			1	1					3	4	1	1										4		2				6
District #9		18	12	4	7	1	5	2			34	22	17	19	7	17		1				4	34	22	19	4				83
Gallatin	C. M. & St.P.	5	3	6	2	1	4				38	8	15	12	18	4				2		20	36	3						59
Gallatin	N. P.	6	6	4	2	3	1		1		33	19	16	7	6	8						2	6	32		15			1	56
Park	N. P.	3	1	1		3	2				3	1	2	7	3								12		1					13
Sweet Grass	N. P.			1							1		1	1											2					2
Meagher	W.S.S.Y.P.						1			1	1	1	2										3							3
Meagher	C.M. & St.P.	1	1	1	1		2				4	2	5	2	1									10						10
Wheatland	C.M. & St.P.		1	2				2			5	6	1	2		1							1	7	2					10
Wheatland	G. N.		1		1		2	3				3	2		1	1								7						7
District #10		15	13	15	6	7	12	5	1	1	85	39	43	33	29	14				2		22	58	59	5	15			1	160
Big Horn	C. B. & Q.	1	1	1							8	5	2		2		2						1	3	6	1				11
Carbon	M. W. & S.	1									2		1		1		1						3							3
"	C. B. & Q.			1					1		4	4	1		1									6						6
"	N. P.	5	2	2	2			3			2	7	2	1	1	4		1					13			3				16
Golden Valley	C.M. & St.P.	1	1										1	1										2						2
Golden Valley	G. N.		4	1				2				5		2									7							7
Musselshell	C. M. & St.P.		2		3	1	3			1	3		7	5	1									13						13
Stillwater	N. P.	1	1	2			3	2			6	2	9	2	2								10		5					15
Treasure	N. P.							1			5		3	2	1											6				6
Yellowstone	C. B. & Q.										10	4	1	3		2								8	2					10
"	G. N.			1	2		3				7	4	6	3										13						13
"	N. P.	8	1	1	3	1	5	2	1		33	18	12	18	6	1						2	20		3	16	2		12	55
District #11		17	12	9	10	2	14	10	2	1	80	49	45	37	15	7	3	1				2	47	37	31	26	2		12	157
Custer	C.M. & St.P.		3	1				1			9	8	2	2	1	1						2		8	4					14
Custer	N. P.						2				2	1	1	2												4				4
Fallon	C.M. & St.P.	1					1				2	2	1	1										4						4
Fallon	N. P.				1		2	2				1	1		3								5							5
Rosebud	C.M. & St.P.	2		3		2		1			9	4	9	3	1									17						17
Rosebud	N. P.		1	1							1	2			1								2			1				3
District #12		3	4	5	1	2	5	4			23	18	14	8	6	1						2	7	25	8	5				47
STATEWIDE		139	135	99	66	43	139	122	6	19	492	438	289	254	150	99	19	5	1	5		89	181	317	195	93	61	10	14	1260

TABLE 36C (Continued)

County	Railroad	No Warning Signs or Signals																								TOTAL
		Steepsst roadway approach road less than 7%. Shortsst olsar visw along railroad from point on roadway 300' removsd.										Motor Vshicls Volume Groups								Railroad Traffic							
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Ovsr	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Ovsr	
Lake	N. P.	1												1						1								1
Lincoln	G. N.		1	2								2	1							1	1		1					3
Distriot #1		1	1	2								2	1	1						2	1		1					4
Blaine	G. N.				1											1				1								1
Bill	G. N.						1					1											1					1
Distriot #2					1		1					1				1				1			1					2
Phillips	G. N.	1										1									1							1
Roosevslt	G. N.										1			1										1				1
Valley	G. N.										1	1									1							1
District #3		1									2	2		1							2			1				3
Dawson	G. N.										1					1					1							1
Prairis	N. P.										1	1												1				1
Wibaux	N. P.	1									1	2											2					2
District #4		1									4	3			1	1					2		2	1				5
Fergus	C.M. & St. P.				1									1						1								1
District #5					1																							
Cascade	G. N.	1	1									1		1							2							2
Judith Basin	G. N.									1		1										1						1
Pondera	Mont. Wast.			1											1						1							1
Teton	G. N.	1										1									1							1
District #6		2	1	1						1		3		1	1						4	1						5
Jefferson	G. N.	1										1								1								1
Lewis & Clark	N. P.		1									1													1			1
District #7		1	1									2								1					1			2
Granite	N. P.										2	1	1								2							2
Mineral	C.M. & St.P.										2	2											2					2
Missoula	N. P.						1						1											1				1
Ravalli	N. P.	1										1									1							1
Sanders	Pri. Ownsd		3									1		2							3							3
Sanders	N. P.			1											1					1								1
District #8		1	3	1			1				4	5	2	2	1					1	6		2	1				10
Deer Lodge	B. A. & P.	1	1	1									1	1				1			2		1					3
Madison	N. P.						1				1				2						2							2
Silvsr Bow	B. A. & P.										1		1											1				1
" "	C.M. & St.P.										1		1								1							1
" "	U. P.				1			1				2										2						2
District #9		1	1	1	1		1	1			3	2	3	1	2			1			5	2	1	1				9
Gallatin	C.M. & St.P.	1	1								1	1				2					2	1						3
Gallatin	N. P.	1	1	1							3	3	1		1	1				2	2	1					1	6
Park	N. P.					1						1									1							1
Meagher	W.S.S.Y.P.										2	1	1								2							2
District #10		2	2	1		1					6	6	2		1	3				2	7	2					1	12
Big Horn	C. B. & Q.			1							5	3	3								6							6
Goldsn Valley	C.M. & St.P.				1								1									1						1
Musselshell	C.M. & St.P.	1	2	1								3	1							2		1	1					4
Yellowstone	N. P.										1		1											1				1
District #11		1	2	2	1						6	6	6							2	6	1	2	1				12
Custsr	C.M. & St.P.									1					1							1						1
Custer	N. P.					1						1								1								1
District #12						1				1		1			1					1		1						2
STATEWIDE		11	11	9	3	2	2	2		2	25	33	14	7	7	5		1		11	33	6	10	4	2		1	67

County	Railroad	Steepest roadway approach road less than 7%. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Groups										Railroad Traffic								TOTAL
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	1000 - 1249	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over	
Bells																														
Madison	U. P.	1										1												1						1
Sanders	N. P.	1												1											1					1
Statewide		2										1		1										1	1					2
Lights Stationary																														
Cascade	G. N.							1								1										1				1
Dawson	N. P.		1											1											1					1
Prairie	C.M. St.P.										2	2												2						2
Park	N. P.						1												1						1					1
Statewide			1				1	1			2	2		1		1			1					2	1	1	1			5
Lights Flashing																														
Lewis & Clark	N. P.		1											1								1								1
Powell	C.M. & St.P.		1											1										1						1
Deer Lodge	N. P.							1									1							1						1
Statewide			2					1						2			1					1	1	1						3
Lights and Bells																														
Silver Bow	B. A. & P.							1													1					1				1
Silver Bow	C.M. & St.P.							1													1				1					1
Fergus	C.M. & St.P.		1	1															2					1	1					2
Statewide			1	1				2											2	2				1	2	1				4
Wigwag and Lights																														
Missoula	C.M. & St.P.		1													1									1					1
Deer Lodge	C.M. & St.P.			2									2												2					2
Broadwater	N. P.			1											1											1				1
Granite	C.M. & St.P.			1										1											1					1
Statewide			1	4									2	1	1	1									4	1				5
Wigwag and Bells																														
Beaverhead	U. P.						1					1												1						1
Statewide							1					1												1						1
Wigwag Lights and Bells																														
Silver Bow	N. P.	1														1									1					1
Gallatin	C.M. & St.P.	1	1	1										3										3						3
Gallatin	N. P.	2											1	1										2						2
Fergus	C.M. & St.P.			1											1									1						1
Beaverhead	U. P.	1												1										1						1
Rosebud	C.M. & St.P.	2											1				1								2					2
Rosebud	N. P.				1										1											1				1
Sanders	N. P.	1												1											1					1
Wheatland	C. M. & St.P.							1								1								1						1
Park	N. P.	1													1							1								1
Mineral	N. P.	1										1													1					1
Statewide		10	1	2	1			1				1	2	6	3	2	1					1	8	5	1					15

Table 36 C (Continued)

County	Railroad	Signs Only																																		TOTAL
		Steepest roadway approach 7% or more. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Groups										Railroad Traffic														
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599		0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over							
Flathead	G. N.	1	2	1	2						2	4	2										2			4									6
Lake	N. P.										2	2											2												2
Lincoln	Pri. Owned	1												1									1												1
District #1		2	2	1	2						2	6	2	1									5			4									9
Blaine	G. N.					1						1															1								1
Hill	G. N.							2				1	1											1	1										2
Toole	G. N										1	1													1										1
District #2						1		2			1	3	1										1	2		1									4
Daniels	G. N.	1	1									1			1								2												2
Phillips	G. N.									1		1															1								1
Roosevelt	G. N.										2	1	1										2												2
Sheridan	G. N.									1		1											1												1
Sheridan	M.St.P.M.St.M.	1				1						1			1									2											2
Valley	G. N.										2	1				1											2								2
District #3		2	1			1				2	4	6	1		2	1							5	2			3								10
Richland	G. N.	1													1									1											1
Richland	N. P.										4	1	1	2									4												4
District #4		1									4	1	1	2	1								4	1											5
Cascade	C.M. & St.P.										1	1												1											1
Cascade	G. N.		2								2		2	1	1								2				2								4
Chouteau	G. N.	2						1				2	1											3											3
Pondera	Mont. West.			1									1										1												1
Teton	C.M. & St.P.				1							1										1													1
Teton	G. N.					2	1				1	1		2	1								4												4
District #6		2	2	1	1	2	1	1			4	5	4	3	2							1	7	4			2								14
Jefferson	C.M. & St.P.										1		1												1										1
Jefferson	G. N.		1	1	1							1	1	1										3											3
District #7			1	1	1						1	1	2	1										3	1										4
Granite	N. P.	1										1														1									1
Mineral	N. P.						1					1													1										1
Missoula	C.M. & St. P.			1							1	1		1								2													2
Powell	N. P.	1													1											1									1
District #8		2		1			1				1	3		1	1							2			1	2									5
Beaverhead	U. P.	1										1												1											1
Beaverhead	G. & P.										2	1		1									2												2
Madison	N. P.	1										1											1												1
Silver Bow	B. A. & P.	3													1			2						2				1							3
Silver Bow	C.M. & St.P.			1									1												1										1
District #9		5		1							2	3	1	1	1			2					3	3	1			1							8
Gallatin	C.M. & St.P.	1									3	2	1	1								2		2											4
Gallatin	N. P.	1	2								1		1	1	1	1							1			2			1						4
Park	N. P.	1		1				1			1		2	1	1								4												4
Wheatland	C.M. & St.P.										1	1												1											1
District #10		3	2	1				1			6	3	4	3	2	1						2	5	3		2			1						13
Carbon	M. W. & S.				1										1								1												1
Golden Valley	C.M. & St.P.	1												1											1										1
Golden Valley	G. N.		1										1											1											1
Yellowstone	G. N.					2	1				1	2	2											4												4
Big Horn	C. B. & Q.										2		2												2										2
Musselshell	C.M. & St.P.	1											1												1										1
District #11		2	1		1	2	1				3	2	6	1	1								1	5	4										10
STATEWIDE		19	9	6	5	6	3	4		2	28	33	22	13	10	2		2				5	30	22	9	6	6	1	1						82

Table 36C (Continued)

County	Railroad	Steepest roadway approach road 7% or more. Shortest clear view along railroad from point on roadway 300' removed.										Motor Vehicle Volume Groups											Railroad Traffic								TOTAL
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	27 - 34	35 & Over	
		No Warnings, Signs or Signals																													
Silver Bow	G. N.	1												1									1								1
Lake	N. P.						1					1												1							1
Rosebud	C.M. & St.P.										1	1														1					1
Statewide		1					1				1	2		1									1	1		1					3
		Wigwag Lights and Bells																													
Cascade	G. N.				1														1						1						1
Statewide					1														1						1						1
Statewide, All Crossings		183	164	117	76	51	147	133	6	23	548	511	329	286	171	110	21	8	3	7	-	-	106	51	60	229	109	70	11	16	1448
				2 @ 1000 - 1249																												
STATEWIDE ALL CROSSING, ALL SYSTEMS		201	187	137	90	58	156	154	6	24	595	512	332	291	183	138	44	23	14	22	10	4	139	22	85	240	117	78	11	16	1608

10 @ 800-899
6 @ 900-999
11 @ 1000-1249
3 @ 1250-1499
3 @ 1500-1999
2 @ 2000 & Over

Significant data deriving from the tabulations are as follows:

A. Federal Aid System: 123 crossings.

1. 106, or 86%, of the crossings are protected only by signs
2. There are 2 crossings which are protected by neither warning signs nor signals.
3. There are 13 crossings which are protected by light signals and bells.
4. There are 2 crossings which are protected by movable wigwag signals.
5. As a class, the greatest number of crossings are so situated that the shortest clear view is greater than 1,950 feet along the railroad.
6. Eleven and four-tenths percent of the total number have shortest clear views of less than 50 feet, 25.2% have shortest clear views of less than 150 feet, 39.8% have shortest clear views of less than 250 feet, 49.6% have shortest clear views of less than 350 feet and 70.7% have shortest clear views of less than 1,050 feet.
7. The average motor vehicle traffic at all crossings is 580 units per 24 hour day.
8. As a class, the greatest number of crossings fall in the group 200-299 vehicles per 24 hour day.
9. Two and four-tenths percent of the crossings serve less than 100 vehicles per day, 15.5% of the crossings serve less than 200 vehicles per day, 32.6% serve less than 300 vehicles per day, 42.3% serve less than 400 vehicles per day and 50.5% of the crossings serve less than 500 vehicles per day.
10. The average volume of railroad traffic at all crossings is 5 per 24 hour day.
11. As a class, the greatest number of crossings serve 2-4 trains per day.
12. Twenty-five and two-tenths percent of all crossings serve less than 5 trains per day, 86.2% serve less than 9 trains per day and 91% serve less than 14 trains per day.

B. State Secondary System; 37 crossings

1. Sixteen and two-tenths percent (6) of the total number of grade crossings are served by approach roads with a maximum gradient of 7% or more.
2. Thirty-four of the crossings (92%) are protected by warning signs only. The balance of the crossings are protected by light signals.
3. As a class, most crossings on the State Secondary are so situated that the shortest clear view along the railroad from a point on the highway 300 feet removed is 1,950 or more feet.
4. Ten and eight-tenths percent of the total number of crossings have shortest clear views of less than 50 feet, 27% have shortest clear views of less than 150 feet, 32.4% have shortest clear views of less than 250 feet, 37.8% have shortest clear views of less than 350 feet. 45.5% have shortest clear views of less than 450 feet. 56.7% have shortest clear views of less than 750 feet and 67.5% have shortest clear views of less than 1,050 feet.

5. The average motor vehicle traffic volume at all crossings is 166 per 24 hour day.
6. As a class, the greatest number of crossings serve the group 100-199 vehicles per 24 hour day.
7. Two and seven-tenths percent of the crossings serve less than 10 vehicles per day, 10.8% serve less than 25 vehicles per day, 21.6% serve less than 50 vehicles per day, 48.7% serve less then 100 vehicles per day and 81.1% serve less than 200 vehicles per day.
8. Crossings on the State Secondary System serve an average of 7 trains per day.
9. As a class, the greatest number of crossings serve from 2-4 trains per day.
10. Five and four-tenths percent of all crossings serve less than 2 trains per day, 48.7% serve less than 5 trains per day, 73% serve less than 9 trains per day and 86.5% serve less than 14 trains per day.

C. Land Service System; 1,448 crossings.

1. Eighty-six (5.9%) of the total number of crossings are served by approach roads with a maximum gradient of 7% or more.
2. Four and eight-tenths percent of the total number of crossings have neither warning signs nor signals, 92.7% of the crossings are protected by signs only, 1.0% are protected by light or bell signals and 1.5% are protected by movable wigwag signals.
3. As a class, most crossings on the Land Service System are so situated that the shortest clear view along the railroad is 1,350 feet or more.
4. Twelve and six-tenths percent of all crossings have shortest clear views of less than 50 feet. 23.9% of all crossings have shortest clear views of less than 150 feet, 32% of all crossings have shortest clear views of less than 250 feet, 37.3% have shortest clear views of less than 350 feet, 40.8% have shortest clear views of less than 450 feet, 51% have shortest clear views of less than 750 feet, 60.2% have shortest clear views of less than 1,050 feet and 62.2% have shortest clear views of less than 1,950 feet.
5. The average motor vehicle traffic volume at all crossings is 44 units per 24 hour day.
6. As a class, the greatest number of crossings serve the group 0-9 vehicles per day.
7. Thirty-five and three-tenths percent of the crossings serve less than 10 vehicles per day, 58% of the crossings serve less than 25 vehicles per day, 77.7% serve less than 50 vehicles per day, 89.5% serve less than 100 vehicles per day, 97.1% serve less than 200 vehicles per day and 98.5% serve less than 300 vehicles per day.
8. Crossings on the Land Service System serve an average of 7.6 trains per day.
9. As a class, the greatest number of crossings serve 2-4 trains per day.
10. Seven and three-tenths percent of the crossings serve less than 2 trains per day, 45% serve less than 5 trains per day, 70% serve less than 9 trains per day, 86% serve less than 14 trains per day and 98% serve less than 27 trains per day.

D. Composite, All Systems; 1,608 crossings.

1. Ninety-three of the total number of crossings are served by approach roads with a maximum gradient of 7% or more.
2. Four and five-tenths percent of the total number of crossings have neither warning signs nor signals, 92.1% are protected by signs only 1.9% are protected by light or bell signals and 1.5% are protected by movable wigwag signals.
3. As a class, most crossings are so situated that the shortest clear view from a point on the roadway 300 feet removed is 1,950 feet or more.
4. Twelve and one-half percent of the total number of crossings have shortest clear views of less than 50 feet, 24.1% have shortest clear views of less than 150 feet, 32.6% have shortest clear views of less than 250 feet, 38.2% have shortest clear views of less than 350 feet, 41.8% have shortest clear views of less than 450 feet, 51.5% have shortest clear views of less than 750 feet, 61.1% have shortest clear views of less than 1,050 feet and 63% have shortest clear views of less than 1,950 feet.
5. The average motor vehicle traffic at all crossings is 88 units per 24 hour day.
6. As a class, the greatest number of crossings serves the group 0-9 vehicles per day.
7. Thirty-one and eight-tenths percent of all crossings serve less than 10 vehicles per day, 52.5% serve less than 25 vehicles per day, 70.6% serve less than 50 vehicles per day, 82% serve less than 100 vehicles per day, 90.5% serve less than 200 vehicles per day, 93.3% serve less than 300 vehicles per day, 94.7% serve less than 400 vehicles per day, 95.5% serve less than 500 vehicles per day, 96.9% serve less than 600 vehicles per day and 98.8% serve less than 1,000 vehicles per day.
8. Crossings on all the systems serve an average of 7.4 trains per day.
9. As a class, the greatest number of crossings serve the group 2-4 trains per day.
10. Eight and six-tenths percent of the crossings serve less than 2 trains per day, 47.3% serve less than 5 trains per day, 65% serve less than 9 trains per day, 86.2% serve less than 14 trains per day, 93.5% serve less than 20 trains per day, and 98.4% serve less than 27 trains per day.

2.131 **Record of Accidents at Railroad Grade Crossings**

Many factors contribute to the causation of accidents at railroad grade crossings. Complete and critical analysis of the problem involves consideration of sight distances, speed and character of both railroad and highway traffic, grade and alignment, existing type of protection and many other elements contributing to the hazard. From data at hand dating from 1931, we find that there have been sixty accidents on the rural road system at railroad grade crossings.

With no attempt being made to present these data in terms of contributory elements of hazard other than clear view and traffic volumes, the tables set forth herebelow summarize the accidents by location, county and road system.

ACCIDENT RECORD [illegible] CLEAR VIEW
AND HIGHWAY AN[illegible] TRAFFIC
FEDER[illegible]

County	Railroad	Steepast roadway approach, less than 7%. Shortest claar view along railroad from a point on roadway 300 feet removed.										Motor Vehicle Volume Groups														Railroad Traffic					TOTAL
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 & Over	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 24	
Daniels	M.St.P. & S.St.M.		1										1																		1
Phillips	G. N.							3								3											3				3
Roosevelt	G. N.										1																			1	1
District #3			1					3			1		1			3											4			1	5
Dawson	N. P.		1																		1						1				1
District #4			1																		1						1				1
Cascade	G. N.							1																	1		1				1
Pondera	G. N.							1						1													1				1
District #6								2						1											1		1	1			2
Musselshell	C.M.St.P.& P.		1				1														1	1				2					2
District #11			1				1														1	1				2					2
Statewide			3				1	5			1		1	1		3	1				2	1			1	2	2	5			1	10
		Lights Stationary																													
Missoula	N. P.										1											1				1						1
District #8											1											1				1						1
Statewide											1											1				1						1
Statewide, All Crossings			3				1	5			2		1	1		3	1				2	1	1		1	3	2	5			1	11

Table 37B
ACCIDENT RECORD CLASSIFIED BY CLEAR VIEW
AND HIGHWAY AND RAILROAD TRAFFIC
STATE SECONDARY

County	Railroad	Signs Only Steepast roadway approach, less than 7%. Shortest claar view along railroad from a point on roadway 300 feet removed.										Motor Vehicle Voluma Groups														Railroad Traffic						TOTAL
		0 - 49	50 - 149	150 - 249	250 - 349	350 - 449	450 - 749	750 - 1049	1050 - 1449	1450 - 1949	1950 & Over	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	0 - 1	2 - 4	5 - 8	9 - 13	14 - 19	20 - 26	
Teton	G. N.		1													1												1				1
District #6			1													1												1				1
Silver Bow	U. P.	1														1													1			1
District #9		1														1													1			1
Custer	C.M.St.P.&P.		1													1														1		1
District #12			1													1														1		1
Statewide		1	2													3												1	1	1		3
		Steepast roadway approach, 7% or more.																														
Chouteau	G. N.	1																1											1			1
District #6		1																1											1			1
Statewide		1																1											1			1
Statewide, All Crossings		2	2													3		1										1	2	1		4

Table 37C
ACCIDENT RECORD CLASSIFIED BY CLEAR VIEW
AND HIGHWAY AND RAILROAD TRAFFIC
LAND SERVICE SYSTEM

Signs Only

County	Railroad	Steepest roadwey approach, less than 7%. Shortest clear view along railroad from e point on roadway 300 feet removed. 0-49	50-149	150-249	250-349	350-449	450-749	750-1049	1050-1449	1450-1949	1950 & Over	Motor Vehicle Volume Groups 0-9	10-24	25-49	50-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799	Railroad Traffic 0-1	2-4	5-8	9-13	14-19	20-26	27-34	35 Over	TOTAL
Flathead	G. N.	1					1					1	1													1	1			2
District #1		1					1					1	1													1	1			2
Bleine	G. N.							1				1						1										1		1
Glacier	G. N.			1												1									1					1
Hill	G. N			1									1												1					1
Liberty	G. N.			1																					1					1
Toole	G. N.										1	1													1					1
District #2				3				1			1	2	1			1		1							1	2	1	1		5
Phillips	G. N.			1			2				1			1	3										2			2		4
Roosevelt	G. N.										1	1																1		1
Velley	G. N.		1								1			1	1								1				1		2
District #3			1	1			2				3	1		2	4								1	2			4		7
Prairie	C.M.St.P.&P.			1										1											1					1
Richland	G. N.										1			1											1					1
District #4				1							1			2											2					2
Fergus	G. N.							1						1											1					1
District #5								1						1											1					1
Cascade	G. N.		1								1		1	1		1							2							2
Pondera	G. N.		1																				1							1
District #6			2								1		1	1		1							3							3
Jefferson	G. N.	1									1	1													1			1		1
Lewis & Clark	N. P.													1																
District #7		1									1	1	1												1			1		2
Missoule	C.M.St.P.&P.	1									1			1	1	1							1		1					2
"	N. P.										1			1												1				1
		1									2			1	1	1							1		1	1				3
Powell	C.M.St.P&P.				2										2											2				2
"	N. P.	1														1											1			1
		1			2										2	1										2	1			3
Ravalli	N. P.										1			1									1							1
District #8		2			2						3			2	3	2							1	1		3	2			7
Deer Lodge	N. P.				1										1										1					1
Madison	C.M.St.P.&P.	1														1									1					1
Silver Bow	C.M.St.P.&P.										1					1										1					1
" "	B.A.& B.								1							1															
District #9		1			1				1		1				1	3									2	2				4
Gallatin	C.M.St.P.&P.	1													1								1							1
"	N. P.										1		1												1	1				2
		1									1		1		1										1					
Meagher	C.M.St.P.&P.						1					1														1					1
District #10		1					1				1	1	1		1								1		2					3
Carbon	C.B. & Q.										1		1												1					1
Golden Valley	G. N.			1								1													1		2			2
Musselshell	C.M.St.P.&P.		1				1					1		1																
District #11			1	1			1				1	2	1	1											2	2				4
Rosebud	C.M.St.P.&P.	1									1		2													2				2
District #12		1									1		2													2				2
Statewide		7	4	6	3	-	5	3	-	-	14	8	8	9	9	7	-	1	-	-	-	-	1	6	13	12	4	6	-	-	42

Wigwag and Lights

Missoule	C.M.St.P.&P.	1														1										1				1
District #8		1														1										1				1
Statewide		1														1										1				1

Wigwag and Lights and Bells

Gallatin	N. P.	1											1												1					1
District #10		1											1												1					1
Rosebud	N. P.				1										1												1			1
District #12					1										1											1		1			2
Statewide		1			1								1		1										1	1	1	1			3
Statewide, All Crossings		9	4	6	4	-	5	3	-	-	14	8	9	9	10	8	-	1	-	-	-	-	1	6	14	13	5	6	-	-	45
STATEWIDE, All Crossings All Systems		11	9	6	4	-	6	8	-	-	16	8	9	9	10	12	1	2	3	1	-	-	4	9	21	14	5	7	-	-	60

2 @ 900- 999
1 @ 1000-1249
1 @ 1250-1499
1 @ 2000-& Over

If we resolve the incidence of the accidents into classes, we find that most of them occurred when the shortest clear view was in excess of 1,950 feet, when the highway traffic was rated at between 100 and 200 vehicles per day and when the railroad traffic ranged from 4 to 9 trains per day. Eighteen and three-tenths percent of the accidents occurred on the Federal Aid System upon which there are located 7.7% of the total number of crossings. Six and seven-tenths percent of the total number of accidents occurred on the State Secondary System, upon which there are located 2.3% of the total number of crossings. Seventy-five percent of the total number of accidents occurred on the Land Service System upon which there are located 90% of the total number of crossings.

While many accidents seem to occur under ideal conditions of sight distance, i.e. 1,950 feet or more along the line of the railroad, it is to be remembered that 37% of all crossings are situated with such conditions of unimpaired clear view. In other words there are more crossings in the category to provide the possibility of accident. By rating the accidents with respect to the number of crossings, we find the ratio extant to be 2.7 per 100 crossings as opposed to 5.5 per 100 crossings in the group with less than 50 feet clear view.

On further study of these crossings at which more than 1,000 feet clear view is afforded, we find in many cases rail and highway traffic in parallel lines or routings thus introducing the possibility that the highway may suddenly "whip" across the railroad affording no great time for stopping. Under these conditions we have ample reason to state that essentially the shortest clear view is restricted to a distance of say less than 300 feet, although the data sets the clear view to 2,000 feet or more. Other circumstances being equal surrounding the location of a grade crossings, obviously the possibility of accident increases as the motor vehicle traffic and rail traffic increase. We find, however, that most accidents occur at crossings bearing motor vehicle traffic ranging from 100 to 200 units. If next we multiply the average for each traffic volume group by the number of crossings serving each such group, we find the highest value to result in the group 100-199 (Ave. 150) served by 138 crossings. In short, the possibilities for accident are greatest in this group. By resolving these data into rated possibilities, we find accident indices as follows:

Rated Accidents per 100 passages.

Traffic volume	0 - 9	0.312
" "	10 - 24	0.159
" "	24 - 49	0.084
" "	50 - 100	0.073
" "	100 - 199	0.058

Data at hand does not provide any measure of constancy in the traffic volumes above 200 Suffice to say that there are as many possibilities for accident in the lower ranges of traffic volume, this being contradictory to the usual presumption that accidents occur in proportion to traffic volume. It is probable that most grade crossings serving the higher traffic volume groups are well served by warning signs or signals and further the approaches are probably well constructed and maintained.

2.14 Inventory of the Federal Aid System as of January 1, 1940

The information set forth hereinbefore derives from basic data secured by the Planning Survey in 1936 and 1937. Subsequent to that time, the Commission has designated four additional routes for inclusion in the Federal Aid System, these being:

Route No. 45 - From a point on Federal Aid Route No. 2 at Big Timber to a point on Federal Aid Route No. 14 near the west city limits of Harlowton and from another point on Federal Aid Route No. 14 near the east city limits of Harlowton to a point on Federal Aid Route No. 15 at or near Moore.

Route No. 46 - From a point on Federal Aid Route No. 3 near Divide via Ralston and Wisdom to a point on Federal Aid Route No. 7 near Gibbons Pass. (1939-1940 data)

Route No. 47 - From a point on Federal Aid Route No. 19 east of Anaconda to a point on Federal Aid Route No. 2 south of Warm Springs. (1939-1940 data).

Route No. 48 - From a junction with Federal Aid Route No. 16 at Hardin, to a junction with Federal Aid Route No. 2 near Custer. (1939-1940 data).

During this period, Federal Aid Route No. 34 in Lincoln and Sanders counties was dropped from the designated Federal Aid System. The description of this route is as follows:

From a point on Federal Aid Route No. 1 near Manicke (in Lincoln County) to a point on Federal Aid Route No. 6 near Trout Creek. (In Sanders County)

Federal Aid Route No. 27 was extended to include the mileage serving traffic between Wibaux and Baker. The description now reads;

Route No. 27 - From a point on Federal Aid Route No. 15 in Wibaux via Baker to Ekalaka. (1939-1940 data).

Routes 45, 46, 47, and 48 and the extension of Route No. 27 as described, were discussed in previous sections of this Chapter as sections of the State Secondary System. The addition of the mileage included in these routes then serves to increase the Federal Aid System mileage by 274.4 miles and to decrease the State Secondary System as discussed by a corresponding amount. By dropping Federal Aid Route No. 34, the net increase in the designated mileage on the Federal Aid System is 247.1 miles (274.4 - 27.3).

The table which follows presents the inventory of the Federal Aid System as of January 1, 1940. The mileages are not in the strictest accord with the contemporary road log for the reason that they were carried only to tenths of miles whereas the mileage set forth in the road log was computed to thousandths.

(0.2) Thus, signifies mileage in wyes.
0.8 Thus, in urban columns signifies unimproved mileage.

INVENTORY OF THE FEDERAL AID SYSTEM
AS OF JANUARY 1, 1940.

Name of County	Federal Aid Route No.	Route Mileage	Constructed Mileage	Unimproved Mileage	Wyes	Present Traveled Way	Road Sections in Urban Areas: City Construction	State Construction, SAP, FAP, NRM, etc. Projects	PRA Construction, FHP, RFHP, etc. Projects	Road Sections, included with Indian Reservation Roads	Sub-total All Road Sections in Urban Areas	Improved Road Sections in Rural Areas: FAP, NRH, WPH, WPGH, RCHP, etc. Projects, State Construction	Traversing State Forests, FAP, NRH, etc. Projects	Traversing Indian Reservations, FAP, NRH, etc.	National Forest Highway Projects	National Park Approach Roads	Military and Others	Sub-total All Road Sections in Rural Areas	Unimproved Road Sections in Rural Areas: County Roads	Roads Traversing State Forests	Roads Traversing National Indian Reservations	Roads in the National Forests	Sub-total All Roads in Rural Areas	Sub-total All Roads Improved & Unimproved in Rural Areas
	1	119.3	116.0	3.4		119.4		1.1			1.1	53.5			57.8	3.6		114.9	3.4				3.4	118.3
	5	63.6	63.6			63.6	1.0	1.5			2.5	45.0	15.4		0.7			61.1						61.1
	36	8.5	8.5			8.5					0.0			8.5				8.5						8.5
	38	9.1	9.1		0.1	9.1		0.8			0.8	(0.1) 8.3						8.4						8.4
Plethead		200.5	197.2	3.4	0.1	200.6	1.0	3.4			4.4	(0.1) 106.8	15.4	8.5	58.5	3.6		192.9	3.4				3.4	196.3
	5	79.7	79.7			79.7				2.7	2.7	7.2		69.8				77.0						77.0
	6	1.0	1.0		0.1	1.0								(0.1) 1.0				1.1						1.1
	36	7.1	7.1		0.1	7.1								(0.1) 7.1				7.2						7.2
Lake		87.8	87.8		0.2	87.8				2.7	2.7	7.2		(0.2) 77.9				85.3						85.3
	1	83.9	78.1	6.0		84.1		1.4			1.4	47.0			29.7			76.7	0.2			5.8	6.0	82.7
	5	30.6	22.7	8.3		31.0	0.2	1.0			1.2	10.6	0.6		10.3			21.5	8.3				8.3	29.8
	33	64.1	42.3	22.9		65.2		0.5			0.5	2.1			39.7			41.8	12.6			10.3	22.9	64.7
Lincoln		178.6	143.1	37.2		180.3	0.2	2.9			3.1	59.7	0.6		79.7			140.0	21.1			16.1	37.2	177.2
Dist. No. 1		466.9	428.1	40.6	0.3	468.7	1.2	6.3		2.7	10.2	(0.1) 173.7	16.0	(0.2) 86.4	138.2	3.6		418.2	24.5			16.1	40.6	458.8
Slaine	1	55.4	55.4			55.4		1.3			1.3	36.5		17.6				54.1						54.1
	1	78.6	78.6			78.6		1.1		0.7	1.8	8.1		60.1	8.6			76.8						76.8
	3	61.2	61.2		0.1	61.2								(0.1) 61.2				61.3						61.3
	39	14.3	14.3			14.3								10.7		3.6		14.3						14.3
	44	12.5	8.8	4.5		13.3								8.8				8.8		4.5			4.5	13.3
Glacier		166.6	162.9	4.5	0.1	167.4		1.1		0.7	1.8	8.1		(0.1) 140.8	8.6	3.6		161.2		4.5			4.5	165.7
	1	59.0	59.0			59.0	0.5	1.0			1.5	57.5						57.5						57.5
	10	24.4	24.4			24.4	0.6	0.4			1.0	23.4						23.4						23.4
Hill		83.4	83.4			83.4	1.1	1.4			2.5	80.9						80.9						80.9
Liberty	1	25.6	25.6			25.6		0.9			0.9	24.7						24.7						24.7
	1	44.4	44.4			44.4		0.9			0.9	43.5						43.5						43.5
	21	44.9	44.9		0.1	44.9		(0.1) 1.8	(0.1)		1.9	43.1						43.1						43.1
Toole		89.3	89.3		0.1	89.3		2.7			2.8	86.6						86.6						86.6
Dist. No. 2		420.3	416.6	4.5	0.2	421.1	1.1	7.4		0.7	9.3	236.8		(0.1) 158.4	8.6	3.6		407.5		4.5			4.5	412.0
Daniels	22	18.0	18.0			18.0		0.5			0.5	17.5						17.5						17.5
	31	13.8	13.8			13.8						13.8						13.8						13.8
	32	16.1	16.1			16.1		0.5			0.5	10.9		4.7				15.6						15.6
		47.9	47.9			47.9		1.0			1.0	42.2		4.7				46.9						46.9
Phillips	1	55.9	55.9			55.9		2.4			2.4	48.1		5.4				53.5						53.5
	16	53.9	10.4	62.0		72.4	0.7	0.1			0.8	9.6						9.6	62.0				62.0	71.6
		109.8	66.3	62.0		128.3	0.7	2.5			3.2	57.7		5.4				63.1	62.0				62.0	125.1
Roosevelt	1	88.7	88.7			88.7	1.2			0.7	1.9	27.7		59.1				86.8						86.8
							0.1																	
	22	20.3	20.2	0.1		20.3		1.1			1.2	19.1						19.1						19.1
	25	6.4	6.4		0.1	6.4				(0.1) 0.5	0.6			5.9				5.9						5.9
	32	35.2	35.2		0.3	35.2								(0.3) 35.2				35.5						35.5
Roosevelt		150.6	150.5	0.1	0.4	150.6	0.1 1.2	1.1		(0.1) 1.2	3.7	46.8		0.3 100.2				147.3						147.3
	22	54.1	54.1			54.1		1.5			1.5	52.6						52.6						52.6
	30	24.2	24.2			24.2		0.8			0.8	23.4						23.4						23.4
Sheridan		78.3	78.3			78.3		2.3			2.3	76.0						76.0						76.0
	1	81.4	81.4			81.4		1.5			1.5	54.1		25.8				79.9						79.9
	42	20.2	18.2	2.2		20.4	0.1	0.5			0.6	17.6						17.6	2.2				2.2	19.8
Valley		101.6	99.6	2.2		101.8	0.1	2.0			2.1	71.7		25.8				97.5	2.2				2.2	99.7
Dist. No. 3		488.2	442.6	64.3	0.4	506.9	0.1 2.0	8.9		(0.1) 1.2	12.3	294.4		(0.3) 136.1				430.8	64.2				64.2	495.0
Dawson	15	59.8	59.8			59.8	0.1	1.5			1.6	58.2						58.2						58.2
	17	22.7	22.7		0.1	22.7						(0.1) 22.7						22.8						22.8
	20	23.3	23.3		0.1	23.3						(0.1) 23.3						23.4						23.4
		105.8	105.8		0.2	105.8	0.1	1.5			1.6	(0.2) 104.2						104.4						104.4
McCone	15	41.5	30.2	12.7		42.9	0.4	1.1			1.5	29.1						29.1	12.3				12.3	41.4
	25	46.5	46.5		0.1	46.5		(0.1) 0.1			0.2	46.4						46.4						46.4
	42	55.0		75.5		75.5													75.5				75.5	75.5
		143.0	76.7	88.2	0.1	164.9	0.4	(0.1) 1.2			1.7	75.5						75.5	87.8				87.8	163.3
Prairie	17	29.4	29.4			29.4		1.0			1.0	28.4						28.4						28.4
	20	40.7	40.7			40.7		2.1			2.1	38.6						38.6						38.6
	22	34.1	17.0	23.7		40.7		0.6			0.6	16.4						16.4	23.7				23.7	40.1
	26	7.6	7.6		0.1	7.6						(0.1) 7.6						7.7						7.7
Richland		82.4	65.3	23.7	0.1	89.0		2.7			2.7	(0.1) 62.6						62.7	23.7				23.7	86.4

(0.2) Thus, signifies mileage in wyes.
0.8 Thus, in urban columns signifies unimproved mileage.

INVENTORY OF THE FEDERAL AID SYSTEM
AS OF JANUARY 1, 1940.

Name of County	Federal Aid Route No.	Route Mileage	Constructed Mileage	Unimproved Mileage	Wyes	Present Traveled Wey	City Construction	State Construction, SAP, FAP, NRM, etc. Projects	FRA Construction, FHP, EFHP, etc. Projects	Road Sections, included with Indian Reservation Roads	Sub-total All Road Sections in Urban Areas	FAP, NRH, WPH, WPGH, ECHP, etc. Projects, State Construction	Traversing State Forests, FAP, NRH, etc. Projects	Traversing Indian Reservations, FAP, NRH, etc.	National Forest Highway Projects	National Park Approach Roads	Military and Others	Sub-total All Road Sections in Rural Areas	County Roads	Roads Traversing State Forests	Roads Traversing National Indian Reservations	Roads in the National Forests	Sub-total All Roads in Rural Areas	Sub-total All Roads Improved & Unimproved in Rural Areas
	15	15.3	15.7			15.7	0.4	1.1			1.5	14.2						14.2						14.2
	27	25.6	11.1	15.6		26.7		0.7			0.7	10.4						10.4	15.6				15.6	26.0
Wibaux		40.9	26.8	15.6		42.4	0.4	1.8			2.2	24.6						24.6	15.6				15.6	40.2
Dist. No. 4		401.5	304.0	127.5	0.4	431.5	0.4 0.5	(0.1) 8.2			9.2	(0.3) 295.3						295.6	127.1				127.1	422.7
	15	59.3	59.3			59.3	0.9	0.8			1.7	57.6						57.6						57.6
												(0.1)												
	16	65.1	20.6	59.9	0.1	80.5		0.5			0.5	20.1						20.2	59.9				59.9	80.1
	43	44.7	37.7	8.4		46.1	0.5				0.5	37.2						37.2	8.4				8.4	45.6
	45	17.8		21.9		21.9													21.9				21.9	21.9
												(0.1)												
Fergus		186.9	117.6	90.2	0.1	207.8	1.4	1.3			2.7	114.9						115.0	90.2				90.2	205.2
	15	90.0	90.0			90.0						90.0						90.0						90.0
												(0.4)												
	18	45.5	45.5		0.4	45.5						45.5						45.9						45.9
												(0.4)												
Garfield		135.5	135.5		0.4	135.5						135.5						135.9						135.9
	15	35.2	35.2			35.2		0.5			0.5	34.7						34.7						34.7
	16	4.9	4.9			4.9						4.9						4.9						4.9
Petroleum		40.1	40.1			40.1		0.5			0.5	39.6						39.6						39.6
Dist. No. 5		362.5	293.2	90.2	0.5	383.4	1.4	1.8			3.2	(0.5) 290.0						290.5	90.2				90.2	380.7
	3	73.6	75.3			75.3	0.3	3.3			3.6	71.7						71.7						71.7
	10	18.4	18.4			18.4	1.1	0.9			2.0	16.4						16.4						16.4
								0.4																
	11	70.1	70.0	0.4		70.4	2.3	1.0	3.2		6.9	43.2			20.3			63.5						63.5
												(0.1)												
	15	7.3	7.3		0.1	7.3						7.3						7.4						7.4
	21	11.8	11.8			11.8						11.8						11.8						11.8
	24	28.8	17.3	7.7		25.0						17.3						17.3	7.7				7.7	25.0
												(0.1)												
	40	2.0	2.0		0.1	2.0		0.7			0.7	1.3						1.4						1.4
												(0.3)												
	41	7.7	7.7		0.3	7.7		5.5			5.5	2.2						2.5						2.5
								0.4				(0.5)												
Cascade		219.7	209.8	8.1	0.5	217.9	3.7	11.4	3.2		18.7	171.2			20.3			192.0	7.7				7.7	199.7
Choutsau	10	72.0	72.0			72.0		0.6			0.6	71.4						71.4						71.4
	15	57.3	57.3			57.3						57.3						57.3						57.3
	45	2.5		2.4		2.4													2.4				2.4	2.4
Judith Basin		59.8	57.3	2.4		59.7						57.3						57.3	2.4				2.4	59.7
	3	21.0	21.0			21.0						17.1		3.9				21.0						21.0
	21	32.0	32.0			32.0	0.2	0.7			0.9	31.1						31.1						31.1
Pondera		53.0	53.0			53.0	0.2	0.7			0.9	48.2		3.9				52.1						52.1
	3	49.3	49.8			49.8	1.1	0.1			1.2	48.6						48.6						48.6
	9	21.6	21.6			21.6	0.1	0.7			0.8	20.8						20.8						20.8
	21	22.7	22.7			22.7		0.7			0.7	22.0						22.0						22.0
Teton		93.6	94.1			94.1	1.2	1.5			2.7	91.4						91.4						91.4
Dist. No. 6		498.1	486.2	10.5	0.5	496.7	5.1	0.4 14.2	3.2		22.9	(0.5) 439.5		3.9	20.3			464.2	10.1				10.1	474.3
	2	4.8	4.8			4.8						4.8						4.8						4.8
	8	53.6	53.6			53.6		1.1			1.1	52.5						52.5						52.5
	14	23.5	23.5			23.5		0.9			0.9	13.3			9.3			22.6						22.6
Broadwater		81.9	81.9			81.9		2.0			2.0	70.6			9.3			79.9						79.9
	2	42.4	42.4			42.4		1.0			1.0	38.1			3.3			41.4						41.4
	3	57.1	57.2			57.2		1.1			1.1	44.2			11.9			56.1						56.1
	8	1.5	1.5			1.5						1.5						1.5						1.5
												(0.1)												
	13	0.9	0.9		0.1	0.9						0.9						1.0						1.0
												(0.1)												
	29	5.8	5.8		0.1	5.8						5.8						5.9						5.9
												(0.2)												
Jefferson		107.7	107.8		0.2	107.8		2.1			2.1	90.5			15.2			105.9						105.9
	3	54.8	54.7			54.7	0.9	2.9			3.8	50.9						50.9						50.9
	8	24.9	24.9			24.9	0.5	2.4			2.9	18.6			3.4			22.0						22.0
	9	45.9	45.9			45.9						45.9						45.9						45.9
	24	66.6	31.8	49.0		80.8						19.6	7.7		4.5			31.8	42.9	4.5		1.6	49.0	80.8
Lewis & Clark		192.2	157.3	49.0		206.3	1.4	5.3			6.7	135.0	7.7		7.9			150.6	42.9	4.5		1.6	49.0	199.6
Dist. No. 7		381.8	347.0	49.0	0.2	396.0	1.4	9.4			10.8	(0.2) 296.1	7.7		32.4			336.4	42.9	4.5		1.6	49.0	385.4
	2	26.6	26.6			26.6						26.6						26.6						26.6
	19	37.1	37.1			37.1		1.0			1.0	32.5			3.6			36.1						36.1
	35	30.0	19.7	11.9		31.6						5.6			14.1			19.7	5.5			6.4	11.9	31.6
Granite		93.7	83.4	11.9		95.3		1.0			1.0	64.7			17.7			82.4	5.5			6.4	11.9	94.3
Mineral	2	79.2	80.2	0.5		80.7			1.3		1.3	47.0			31.9			78.9	0.3			0.2	0.5	79.4
												(0.1)												
	2	60.0	60.1		0.1	60.1	0.3	2.2			2.5	57.3			0.3			57.7						57.7
	5	15.3	15.3			15.3						7.2		8.1				15.3						15.3
	7	17.7	17.7			17.7	1.3				1.3	15.8					0.6	16.4						16.4
												(0.1)												
	24	36.3	8.8	29.3	0.1	38.1						8.8						8.9	9.3	20.0			29.3	38.2
												(0.2)												
Missoula		129.3	101.9	29.3	0.2	131.2	1.6	2.2			3.8	89.1		8.1	0.3		0.6	98.3	9.3	20.0			29.3	127.6

(0.2) Thus, signifies mileage in wyes.
0.8 Thus, in urban columns signifies unimproved mileage.

INVENTORY OF THE FEDERAL AID SYSTEM
AS OF JANUARY 1, 1940.

Name of County	General Routs Data						Road Sections in Urban Areas					Improved Road Sections in Rural Areas							Unimproved Road Sections in Rural Areas					
	Federal Aid Route No.	Route Mileage	Constructed Mileage	Unimproved Mileage	Wyes	Present Traveled Way	City Construction	State Construction, SAP, FAP, NEH, etc. Projects	FRA Construction, FEP, NFEH, etc. Projects	Road Sections, included with Indian Reservation Roads	Sub-total All Road Sections in Urban Areas	FAP, NEH, NFH, WPGH, ECFP, etc. Projects, State Construction	Traversing State Forests, FAP, NEH, etc. Projects	Traversing Indian Reservations, FAP, NEH, etc.	National Forest Highway Projects	National Park Approach Roads	Military and Others	Sub-total All Road Sections in Rural Areas	County Roads	Roads Traversing State Forests	Roads Traversing National Indian Reservations	Roads in the National Forests	Sub-total All Roads in Rural Areas	Sub-total All Roads Improved & Unimproved in Rural Areas
	2	35.3	35.3			35.3	0.8	0.3			1.1	34.2						34.2						34.2
												(0.1)												
	8	27.8	27.8		0.1	27.8						26.9			0.9			27.9						27.9
	24	29.7	0.0	37.7		37.7													37.7				37.7	37.7
												(0.1)												
Powell		92.8	63.1	37.7	0.1	100.8	0.8	0.3			1.1	61.1			0.9			62.1	37.7				37.7	99.8
	7	76.8	76.8			76.8		2.1			2.1	57.1			17.6			74.7						74.7
	35	26.3	16.5	11.0		27.5									16.5			16.5	9.0		2.0	11.0	27.5	27.5
	46			3.9		3.9															3.9	3.9	3.9	3.9
Ravalli		103.1	93.3	14.9		108.2		2.1			2.1	57.1			34.1			91.2	9.0			5.9	14.9	106.1
	6	116.1	116.1			116.1		0.6	0.8		1.4	74.4		26.5	13.8			114.7						114.7
	36	32.7	12.0	25.1		37.1				0.3	0.3			12.0				12.0	6.5		17.6	0.7	24.8	36.8
Sanders		148.8	128.1	25.1		153.2		0.6	0.8	0.3	1.7	74.4		38.5	13.8			126.7	6.5		17.6	0.7	24.8	151.5
Dist. No. 8		646.9	550.0	119.4	0.3	669.4	2.4	6.2	2.1	0.3	11.0	(0.3) 393.4		46.6	98.7		0.6	539.6	68.3	20.0	17.6	13.2	119.1	658.7
	3	88.4	88.4			88.4	0.3	2.2			2.5	85.9						85.9						85.9
	46	59.6	4.4	62.4		66.8						4.4						4.4	39.6			22.8	62.4	66.8
Beaverhead		148.0	92.8	62.4		155.2	0.3	2.2			2.5	90.3						90.3	39.6			22.8	62.4	152.7
												(0.1)												
	2	15.2	15.3		0.1	15.3						15.3						15.4						15.4
	19	29.4	29.4			29.4	1.3	1.0			2.3	17.9			9.2			27.1						27.1
	35	1.3		2.0		2.0															2.0	2.0	2.0	2.0
	46	16.0		16.9		16.9													16.9				16.9	16.9
	47	6.2	6.2			6.2						6.2						6.2						6.2
												(0.1)												
Deer Lodge		68.1	50.9	18.9	0.1	69.8	1.3	1.0			2.3	39.4			9.2			48.7	16.9			2.0	18.9	67.6
	3	7.3	7.3			7.3						7.3						7.3						7.3
												(0.1)												
	13	79.0	79.0		0.1	79.0						74.0			5.0			79.1						79.1
							0.9																	
	29	58.4	36.1	23.1		59.2		3.1			4.0	33.0						33.0	22.2				22.2	55.2
							0.9					(0.1)												
Madison		144.7	122.4	23.1	0.1	145.5		3.1			4.0	114.3			5.0			119.4	22.2				22.2	141.6
	2	28.9	28.9			28.9	1.0	3.6			4.6	18.9			5.4			24.3						24.3
	3	34.4	34.7			34.7		1.0			1.0	33.7						33.7						33.7
	35	1.5	1.5			1.5						1.5						1.5						1.5
	46	3.4	3.3	1.2		4.5						3.3						3.3	1.2				1.2	4.5
Silver Bow		68.2	68.4	1.2		69.6	1.0	4.6			5.6	57.4			5.4			62.8	1.2				1.2	64.0
							0.9					(0.2)												
Dist. No. 9		489.0	334.5	105.6	0.2	440.1	2.6	10.9			14.4	301.4			19.6			321.2	79.9			24.8	104.7	425.9
	2	48.1	48.1			48.1	0.3	5.0			5.3	42.2			0.6			42.8						42.8
	12	9.8	9.8			9.8						1.1			8.7			9.8						9.8
															(0.1)									
	13	26.4	26.4		0.1	26.4						2.5			23.9			26.5						26.5
															(0.1)									
Gallatin		84.3	84.3		0.1	84.3	0.3	5.0			5.3	45.8			33.2			79.1						79.1
												(0.1)												
	11	60.9	60.9		0.1	60.9		1.2			1.2	40.5			19.2			59.8						59.8
												(0.1)												
	14	42.5	42.5		0.1	42.5						42.5						42.6						42.6
												(0.2)												
Meagher		103.4	103.4		0.2	103.4		1.2			1.2	83.0			19.2			102.4						102.4
	2	31.8	31.8			31.8	0.2	1.8			2.0	29.8						29.8						29.8
	11	93.2	97.8	1.1		98.9	1.1	0.8			1.9	82.4			14.6			97.0						97.0
Park		125.0	129.6	1.1		130.7	1.1	2.6			3.9	112.2			14.6			126.8						126.8
	2	37.3	37.3			37.3		0.9			0.9	36.4						36.4						36.4
	45	28.1	9.1	22.1		31.2		0.5			0.5	8.6						8.6	22.1				22.1	30.7
Sweet Grass		65.4	46.4	22.1		68.5		1.4			1.4	45.0						45.0	22.1				22.1	67.1
	14	45.4	45.4			45.4		0.9			0.9	44.5						44.5						44.5
	45	34.7	10.6	27.2		37.8						10.6						10.6	27.2				27.2	37.8
Wheatland		80.1	56.0	27.2		83.2		0.9			0.9	55.1						55.1	27.2				27.2	82.3
							1.1					(0.2)			(0.1)									
Dist. No.10		458.2	419.7	50.4	0.3	470.1	0.5	11.1			12.7	341.1			67.0			408.4	49.3				49.3	457.7
	16	79.6	79.6			79.6	0.5	0.5		0.1	1.1	22.5		56.0				78.5						78.5
														(0.2)										
	37	39.0	30.1	10.1	0.2	40.2								30.1				30.3			10.1		10.1	40.4
							0.5																	
	48	24.3	3.4	22.8		26.2					0.5	3.4						3.4	22.3				22.3	25.7
							0.5							(0.2)										
Sig Horn		142.9	113.1	32.9	0.2	146.0	0.5	0.5		0.1	1.6	25.9		86.1				112.2	22.3		10.1		32.4	144.6
	4	51.3	51.3			51.3		1.5			1.5	49.8						49.8						49.8
	28	41.8	41.8			41.8	0.5	1.9			2.4	35.2			4.2			39.4						39.4
Carbon		93.1	93.1			93.1	0.5	3.4			3.9	85.0			4.2			89.2						89.2
Goldan Valley	14	29.1	29.1			29.1		1.0			1.0	28.1						28.1						28.1
							1.1																	
	14	55.4	52.3	3.1		55.4	0.3	1.7			3.1	50.3						50.3	2.0				2.0	52.3
	16	47.1	47.1			47.1		0.7			0.7	46.4						46.4						46.4
							1.1																	
Musselshell		102.5	99.4	3.1		102.5	0.3	2.4			3.8	96.7						96.7	2.0				2.0	98.7

(0.2) Thus, signifies mileage in wyes.
0.8 Thus, in urban columns signifies unimproved mileage.

INVENTORY OF THE FEDERAL AID SYSTEM
AS OF JANUARY 1, 1940.

Name of County	General Route Data						Road Sections in Urban Areas					Improved Road Sections in Rural Areas							Unimproved Road Sections in Rural Areas					
	Federal Aid Route No.	Route Mileage	Constructed Mileage	Unimproved Mileage	Wyes	Present Traveled Way	City Construction	State Construction, SAP, PAP, NRH, etc. Projects	FRA Construction, PHF, EFHP, etc. Projects	Road Sections, included with Indian Reservation Roads	Sub-total All Road Sections in Urban Areas	PAP, NRH, WPH, MPGH, ECHP, etc. Projects, State Construction	Traversing State Forests, PAP, NRH, etc. Projects	Traversing Indian Reservations, PAP, NRH, etc.	National Forest Highway Projects	National Park Approach Roads	Military and Others	Sub-total All Road Sections in Rural Areas	County Roads	Roads Traversing State Forests	Roads Traversing National Indian Reservations	Roads in the National Forests	Sub-total All Roads in Rural Areas	Sub-total All Roads Improved & Unimproved in Rural Areas
Stillwater	2	38.7	38.7			38.7		0.6			0.6	38.1						38.1						38.1
Treasure	2	28.8	28.8			28.8						28.8						28.8						28.8
	2	83.1	83.3			83.3	1.1	2.5			3.6	79.7						79.7						79.7
	4	3.9	3.9			3.9		0.6			0.6	3.3						3.3						3.3
												(0.1)												
	16	45.6	45.6		0.1	45.6						32.5		13.1				45.7						45.7
	48	6.2		7.6		7.6													7.6			7.6	7.6	7.6
Yellowstone		138.8	132.8	7.6	0.1	140.4	1.1	3.1			4.2	(0.1) 115.5		13.1				128.7	7.6				7.6	136.3
Dist. No.11		573.9	535.0	43.6	0.3	578.6	1.6 2.4	11.0		0.1	15.1	(0.1) 418.1		(0.2) 99.2	4.2			521.8	31.9		10.1		42.0	563.8
	23	38.3	38.3			38.3						38.3						38.3						38.3
	27	12.8	13.3	1.0		14.3	1.0	0.3			1.3	13.0						13.0						13.0
Carter		51.1	51.6	1.0		52.6	1.0	0.3			1.3	51.3						51.3						51.3
												(0.1)												
	2	68.6	68.6		0.1	68.6	0.5	0.8			1.3	58.1					9.2	67.4						67.4
	17	24.1	24.1			24.1						24.1						24.1						24.1
	18	20.3	19.6	0.7		20.3	0.7 0.4				1.1	19.2						19.2						19.2
	23	50.4	50.4			50.4	0.5	0.1			0.6	49.8						49.8						49.8
Custar		163.4	162.7	0.7	0.1	163.4	0.7 1.4	0.9			3.0	(0.1) 151.2					9.2	160.5						160.5
	2	44.0	44.0			44.0		2.1			2.1	41.9						41.9						41.9
	27	42.9	26.0	22.4		48.4	0.5	0.7			1.2	25.3						25.3	21.9				21.9	47.2
Fallon		86.9	70.0	22.4		92.4	0.5	2.8			3.3	67.2						67.2	21.9				21.9	89.1
	23	51.1	47.4	4.7		52.1						47.4						47.4	4.7				4.7	52.1
	37	39.5	35.0	4.4		39.4						21.3			13.7			35.0	3.2		1.2		4.4	39.4
Powdar River		90.6	82.4	9.1		91.5						68.7			13.7			82.4	7.9		1.2		9.1	91.5
	2	42.8	40.8	2.1		42.9	2.1	0.1			2.2	40.7						40.7						40.7
	14	65.0	12.7	56.6		69.3	0.3				0.3	12.7						12.7	56.3				56.3	69.0
	18	18.0	18.0			18.0						18.0						18.0						18.0
	37	26.1		30.9		30.9													2.4	28.5			30.9	30.9
Rosebud		151.9	71.5	89.6		161.1	2.4	0.1			2.5	71.4						71.4	58.7	28.5			87.2	158.6
Dist. No.12		543.9	438.2	122.8	0.1	561.0	4.6 1.4	4.1			10.1	(0.1) 409.8			13.7		9.2	432.8	88.5		28.5	1.2	118.2	551.0
STATEWIDE		5671.2	4995.1	828.4	3.7	5823.5	8.7 22.6	0.4 (0.2) 99.5	5.3	0.3 (0.1) 4.7	141.2	(2.5) 3889.6	23.7	(0.8) 530.6	(0.1) 402.7	7.2	9.8	4867.0	676.9	24.5	60.7	56.9	819.0	5686.0

From the table we find that the total construction mileage along the direction of the several routes in rural areas has increased to 4863.6 miles (4867.0 less mileage included in wyes, 3.4). 1936 data shows a total improved mileage of 4680.4, hence the apparent increase in construction is 183.2 miles. Of this mileage there were 48.2 miles previously included as improved mileage on the State Secondary System, thus we find that the net increase in construction mileage along the Federal Aid System was 135.0 miles during the period 1936 to 1940. It is to be noted that the addition of the construction mileage to the Federal Aid System, 48.2 miles previously included with the State Secondary System, has the effect of decreasing the construction mileage on the State Secondary System by a corresponding amount.

CHAPTER III

THE DISTRIBUTION OF TRAFFIC AND RELATIVE ADEQUACY OF HIGHWAY IMPROVEMENT

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III
THE DISTRIBUTION OF TRAFFIC AND RELATIVE ADEQUACY OF HIGHWAY IMPROVEMENT

3.01--Classification of Entire Highway Mileage by Traffic Volume Groups

With a view toward arriving once again at the significant traffic volume over the statewide road system, the traffic data set forth in the previous chapter are repeated in essence in the tables which follow. As a corollary of the above, these data are broken further to present information respecting relative use of the several road systems, or parts thereof by passenger units and commercial vehicles. Discussion in this chapter lends support to the idea that our road system is a very important cog in the wheel of Montana industry and commerce.

Since the systems are progressing toward ultimate completion in stages, the data are classified in categories relating to traffic use on improved sections and, those so-called unimproved sections which have reached their present stage of development as a consequence of progressive maintenance.

Data with respect to traffic volume in composite are presented as follows:

Table 38A

CLASSIFICATION OF ENTIRE RURAL ROAD MILEAGE BY TRAFFIC VOLUME GROUPS

System Designation	Status of Improvement a/	Traffic Volume Groups																Total Length	Average Traffic
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 - 2999		
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.		
b/ Federal Aid System	Improved 1	5.2	45.1	59.1	411.9	972.7	926.9	653.9	542.1	578.3	224.5	112.6	92.4	10.5	9.0	10.1	19.9	6.2	4,680.4	338
	Unimproved 2	27.6	191.5	235.8	202.5	30.9	0.2	0.1											738.6	43
	Sub-Total 3	32.8	236.6	344.9	614.4	1,003.6	927.1	654.0	542.1	578.3	224.5	112.6	92.4	10.5	9.0	10.1	19.9	6.2	5,419.0	298
c/ State Secondary System	Improved 1	0.8	4.2	11.1	268.5	170.0	43.7	18.5	15.3	15.2	7.7	1.1	0.5	0.4	1.2	1.0			559.2	156
	Unimproved 2	207.3	941.9	926.8	497.7	145.0	2.4	0.9	0.7	0.9									2,723.6	40
	Sub-Total 3	208.1	946.1	937.9	766.2	315.0	46.1	19.4	16.0	16.1	7.7	1.1	0.5	0.4	1.2	1.0			3,282.8	59
d/ Land Service System	Improved 1	5.0	4.2	18.2	25.0	51.6	63.3	6.4	3.5	2.1	0.6	0.5							180.4	170
	Unimproved 2	40,360.3	9,640.9	4,891.4	1,490.9	404.3	44.2	14.0	1.1	1.0									56,848.1	11
	Sub-Total 3	40,365.3	9,645.1	4,909.6	1,515.9	455.9	107.5	20.4	4.6	3.1	0.6	0.5							57,028.5	12
All Rural Roads	Improved 1	11.0	53.5	88.4	705.4	1,194.3	1,033.9	678.8	560.9	595.6	232.8	114.2	92.9	10.9	10.2	11.1	19.9	6.2	5,420.0	314
	Unimproved 2	40,595.2	10,774.3	6,104.0	2,191.1	580.2	46.8	15.0	1.8	1.9									60,310.3	13
	Sub-Total 3	40,606.2	10,827.8	6,192.4	2,896.5	1,774.5	1,080.7	693.8	562.7	597.5	232.8	114.2	92.9	10.9	10.2	11.1	19.9	6.2	65,730.3	38

a/ 1. Improved to acceptable standards. See Note 2/ Table 1.

2. Not improved to acceptable standards, existing in present state of development as a function of progressive maintenance.

3. Composite.

b/ See Chapter II, Page 2-1 for description of State Secondary System.

c/ See Chapter II, Page 2-1 for description of State Secondary System.

d/ See Chapter II, Page 2-2 for description of Land Service System.

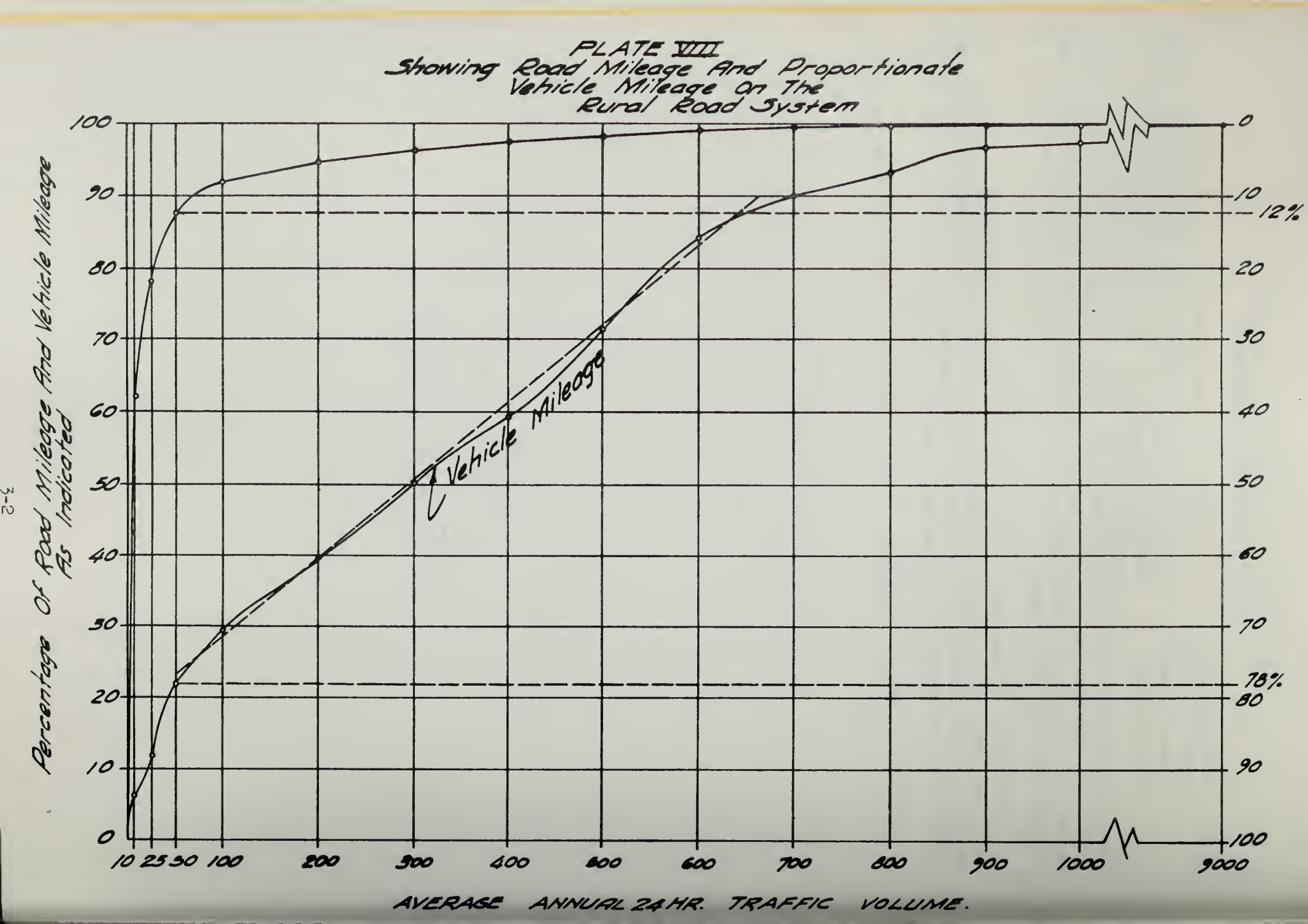


PLATE VIII
Showing Road Mileage And Proportionate
Vehicle Mileage on The
Rural Road System
Percentage Of Road Mileage And Vehicle Mileage
As Indicated
Vehicle Mileage
12%
78%
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
10 25 50 100 200 300 400 500 600 700 800 900 1000 9000
AVERAGE ANNUAL 24 HR. TRAFFIC VOLUME.

Table 308

VEHICLE MILES ACCRUING TO EACH OF THE SEVERAL RURAL ROAD SYSTEMS CLASSIFIED BY TRAFFIC VOLUME GROUPS

System Designation	Status of Imprmt. a/		Traffic Volume Groups 0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 - 2999	Total Vehicle Miles
Federal	Improved	1	25	735	2,095	29,600	139,800	221,750	219,200	285,878	304,500	139,800	80,900	75,300	9,555	9,690	13,300	33,350	14,850	1,500,328
Aid	Unimproved	2	130	3,065	9,950	14,375	4,370	47	4											31,941
System	Sub-Total	3	155	3,800	12,045	43,975	144,170	221,797	219,204	285,878	304,500	139,800	80,900	75,300	9,555	9,690	13,300	33,350	14,850	1,612,269
State	Improved	1	4	75	433	15,550	26,850	11,515	6,825	7,250	6,810	5,270	870	448	390	1,422	1,450			87,162
Secondary	Unimproved	2	979	15,138	32,350	35,241	20,540	567	298	298	467									105,878
System	Sub-Total	3	983	15,213	32,783	50,791	47,390	12,082	7,123	7,548	9,277	5,270	870	448	390	1,422	1,450			193,040
Land	Improved	1	24	68	647	1,801	7,435	15,200	2,150	1,512	1,110	374	360							30,682
Service	Unimproved	2	158,976	109,932	208,702	89,871	48,516	9,724	4,480	462	505									631,168
System	Sub-Total	3	159,000	110,000	209,349	91,672	55,951	24,924	6,630	1,974	1,615	374	360							661,850
All	Improved	1	53	878	3,175	46,951	174,085	248,465	228,175	294,640	314,420	144,445	82,130	76,748	9,945	11,112	14,750	33,350	14,850	1,606,172
Systems	Unimproved	2	160,085	128,135	251,002	139,487	73,426	10,338	4,782	760	972									768,987
	Sub-Total	3	160,138	129,013	254,177	186,438	247,511	258,803	232,957	295,400	315,392	144,445	82,130	76,748	9,945	11,112	14,750	33,350	14,850	2,467,159

a/ 1. Improved to acceptable standards.

2. Not improved to acceptable standards, existing in present state of development as a function of progressive maintenance.

3. Composite.

Review of the tabulations and the plate discloses the following significant data:

1. The Federal Aid System, while it comprises but 8.2% of the total rural road mileage, furnishes the medium for the generation of 65.4% of all rural traffic.

2. The State Secondary System, comprising 5.0% of the total rural road mileage, furnishes the medium for the generation of 7.8% of all rural traffic.

3. The Land Service System, comprising 86.8% of the total rural road mileage, furnishes the medium for the generation of 26.8% of all rural traffic.

4. By reference to the plate, we find that vehicle mileage accrues at a fairly uniform rate when traffic is more than 50 vehicles per day and less than 700 vehicles per day. In other words, while the road mileage in each traffic volume group is decreasing, the traffic volumes are of such increasing magnitude that the line develops uniformity as regards the generation of vehicle miles, this in accordance with previous discussion in Section 2.043 of the previous chapter.

5. In all, there are 614.3 miles (11.3%) on the Federal Aid System which bear less than 50 vehicles per day. Of the total there are but 109.4 miles (2.0%) which are improved to prevailing high standards.

6. There are 2,092.1 miles (63.7%) on the State Secondary System bearing traffic less than 50 vehicles per day. Of this total there are 16.1 mi. (0.5%) which are improved to prevailing high standards.

7. The map, Plate IV shows all roads carrying traffic in excess of 50 vehicles per day as indicated by the legend inscribed thereon. Other data respecting widths, surface types, etc. are given in the previous chapter of this report. Detailed information with respect to traffic deficiencies on improved sections of the Federal Aid and the State Secondary Systems is as follows:

Teble 39A

SHOWING SIGNIFICANT LENGTHS OF THE IMPROVED FEDERAL AID SYSTEM

BEARING LESS THAN 50 VEHICLES PER DAY

County	Surface Type	Project No.	Width Groups										All Widths	
			Under 16		16-26		27-35		36-44		45 & Over			
			Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	Graded & Drained	87B					4.1	45					4.1	45
Lake	Graded & Drained	87B					6.6	44					6.6	44
Lincoln	Graded & Drained	FH 2C			2.3	29							2.3	29
District #1					2.3	29	10.7	44					13.0	42
Daniels	Low Type Bit.	274			6.6	41							6.6	41
Roosevelt	Low Type Bit.	FL 2A			4.1	21							4.1	21
District #2					10.7	33							10.7	33
McCone	Plain Macadam	247D			7.8	10							7.8	10
Richland	Plain Macadam	273D			3.8	29							3.8	29
District #3					11.6	16							11.6	16
Garfield	Graded & Drained	247C			12.6	13							12.6	13
	Graded & Drained	247E					9.3	13					9.3	13
District #4					12.6	13	9.3	13					21.9	13
Granite	Graded & Drained	FH 16A	12.1	29									12.1	29
	Graded & Drained	FH 16B	1.5	32									1.5	32
	Plain Macadam	161 C			2.3	36							2.3	36
District #8			13.6	29	2.3	36							15.9	30
Madison	Low Type Bit.	244D			0.1	25							0.1	25
District #9					0.1	25							0.1	25
Big Horn	Graded & Drained	334C			8.1	47							8.1	47
Musselshell	Graded & Drained	328F					0.4	40					0.4	40
District #11					8.1	47	0.4	40					8.5	47
Carter	Low Type Bit.	262B			6.9	46							6.9	46
Powder River	Graded & Drained	FH 53A			5.2	15							5.2	15
" "	Graded & Drained	334B			8.8	18							8.8	18
" "	Graded & Drained	334A			10.2	30							10.2	30
Rosebud	Plain Macadam	328D			7.1	36							7.1	36
"	Plain Macadam	328C			5.6	11							5.6	11
District #12					12.7	25							12.7	25
STATEWIDE	Graded & Drained	All	13.6	29	47.2	24	20.4	30					81.2	26
	Plain Macadam	All			26.6	21							26.6	21
	Low Type Bit.	All			17.7	38							17.7	38
	Composite		13.6	29	91.5	26	20.4	30					125.5	27

Table 39B

SHOWING SIGNIFICANT LENGTHS OF THE STATE SECONDARY SYSTEM

BEARING LESS THAN 50 VEHICLES PER DAY

County	Surface Type	Project No.	Width Groups										All Widths	
			Under 16		16-26		27-35		36-44		45 & Over			
			Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	Low Type Bit.	377			0.3	35							0.3	35
District #1					0.3	35							0.3	35
Toole	Plain Macadam	366			3.7	28							3.7	28
District #2					3.7	28							3.7	28
Chouteau	Plain Gravel	348			4.3	43							4.3	43
District #6					4.3	43							4.3	43
Deer Lodge	Plain Macadam	304			2.3	32							2.3	32
District #9					2.3	32							2.3	32
Musselshell	Plain Gravel		4.3	15									4.3	15
Stillwater	Plain Macadam				2.3	42							2.3	42
	Plain Gravel				1.5	23							1.5	23
District #11			4.3	15	3.8	35							8.1	24
Custer	Plain Macadam	350A&B			8.2	15							8.2	15
Powder River	Plain Gravel	317			4.2	35							4.2	35
Rosebud	Plain Gravel	362			2.6	35							2.6	35
District #12					15.0	24							15.0	24
STATEWIDE	Plain Gravel		4.3	15	12.6	36							16.9	31
	Plain Macadam				16.5	24							16.5	24
	Low Type Bit.				0.3	35							0.3	35
	Composite		4.3	15	29.4	29							33.7	28

It is to be noted that the total length of the roadway whereon deficiencies are apparent does not coincide with the lengths given on the traffic density classification, this for the reason that the deficiencies were presumed to be in effect for the length of most of the projects.

3.02 Classification of Highway Mileage by Increments of Truck and Bus Volume Groups

The classification of sections of the total highway mileage (Federal Aid System and the State Secondary System) discloses the fact that commercial traffic is somewhat more constant than that manifested by passenger cars alone. The tabulation following immediately hereafter presents information to this end as follows:

Table 40B

CLASSIFICATION OF THE STATE SECONDARY SYSTEM

BY AVERAGE UNIT VEHICLE TRAFFIC VOLUMES.

Financial District No.	Vehicle Classification: Passenger Cars		Light Trucks		Medium Trucks		Heavy Trucks		Tractor-trucks & Semi-Trailers		Trucks & Trailers		School Buses		Passenger Buses		All Vehicles	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
1	178.3	45	178.3	14	178.3	1-	178.3	1-	178.3	1-	178.3	1-	178.3	1-	178.3	1	178.3	62
2	157.2	65	157.2	16	157.2	2-	157.2	1-	157.2	1-	157.2	1	157.2	1-	157.2	1	157.2	86
3	349.7	53	349.7	13	349.7	1-	349.7	1-	349.7	1-	349.7	1-	349.7	1-	349.7	1-	349.7	68
4	253.8	29	253.8	7	253.8	1-	253.8	1-	253.8	1-	253.8	1-	253.8	1-	253.8	1-	253.8	37
5	266.0	42	266.0	11	266.0	1-	266.0	1-	266.0	1-	266.0	1-	266.0	1-	266.0	1-	266.0	55
6	351.1	33	351.1	10	351.1	1	351.1	1-	351.1	1-	351.1	1-	351.1	1-	351.1	1-	351.1	45
7	125.9	42	125.9	11	125.9	1-	125.9	1-	125.9	1-	125.9	1-	125.9	1-	125.9	1-	125.9	53
8	207.1	33	207.1	8	207.1	1-	207.1	1-	207.1	1-	207.1	1-	207.1	1-	207.1	1-	207.1	44
9	348.8	48	348.8	10	348.8	1	348.8	1-	348.8	1-	348.8	1-	348.8	1-	348.8	1-	348.8	61
10	253.2	106	253.2	17	253.2	3-	253.2	1-	253.2	1-	253.2	1	253.2	1-	253.2	1-	253.2	128
11	359.5	52	359.5	12	359.5	1-	359.5	1-	359.5	1-	359.5	1-	359.5	1-	359.5	1-	359.5	66
12	432.2	20	432.2	7	432.2	1-	432.2	1-	432.2	1-	432.2	1-	432.2	1-	432.2	1-	432.2	27
Statewide	3282.8	46	3282.8	11	3282.8	1-	3282.8	1-	3282.8	1-	3282.8	1-	3282.8	1-	3282.8	1-	3282.8	59

LEGEND

1/ Light Trucks - with rated capacity of $1\frac{1}{2}$ tons and less.

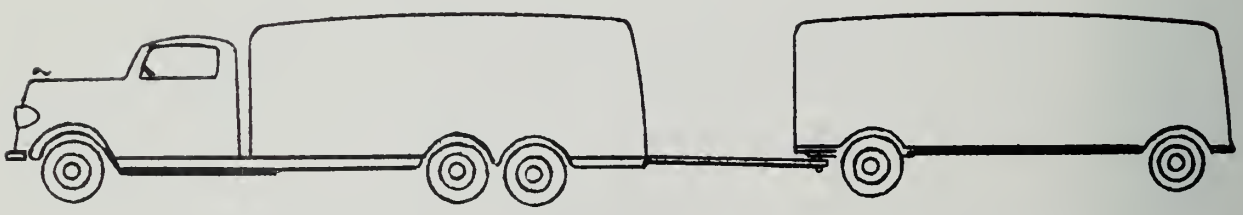
2/ Medium Trucks - with rated capacity of more than $1\frac{1}{2}$ tons and less than 5 tons.

3/ Heavy Trucks - with rated capacity of 5 tons and more.

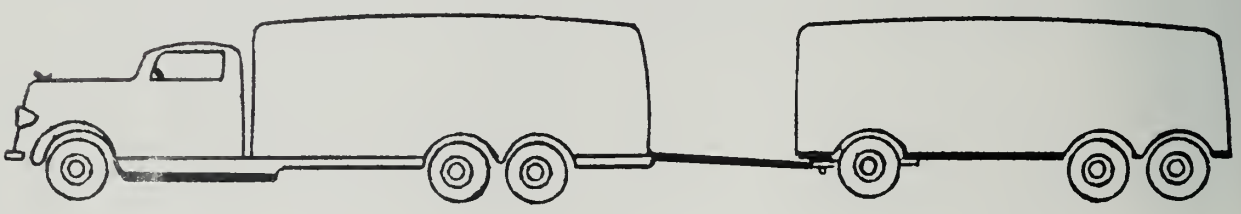
DIAGRAM SHOWING TYPES AND COMBINATIONS OF VEHICLES

TRUCK

TRACTOR-TRUCK and SEMITRAILER



TRUCK (3 AXLE) FULL TRAILER



TRUCK (3 AXLE) FULL TRAILER (3 AXLE)

Table 40A

CLASSIFICATION OF THE FEDERAL AID SYSTEM

SHOWING THE MILEAGE AND AVERAGE DAILY TRAFFIC FOR EACH ROUTE OF THE FEDERAL AID SYSTEM, ACCORDING TO SURFACE TYPE AND FOR EACH TYPE OF VEHICLE.

F. A. Route No.	Vehicle Classification	Surface Type														All Types	
		Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved			
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
1	Passenger Care					161.7	233	416.3	301	39.9	91	10.2	275	31.7	43	17.8	69	677.6	255
	Light Trucks 1/					161.7	54	416.3	66	39.9	23	10.2	73	31.7	20	17.8	19	677.6	58
	Medium Trucks 2/					161.7	3	416.3	3	39.9	2	10.2	4	31.7	0	17.8	2	677.6	3
	Heavy Trucke 3/					161.7	1	416.3	1	39.9	1	10.2	1	31.7	0	17.8	1	677.6	1
	Tractor-trucks &																		
	Semi-trailers					161.7	3	416.3	4	39.9	1	10.2	2	31.7	0	17.8	1	677.6	3
	Trucks & Trailers					161.7	1	416.3	1	39.9	1	10.2	1	31.7	0	17.8	1	677.6	1
	School Buses					161.7	1	416.3	1	39.9	0	10.2	0	31.7	1	17.8	1	677.6	1
	Passenger Buses					161.7	2	416.3	2	39.9	1	10.2	2	31.7	1	17.8	1	677.6	2
						161.7	298	416.3	379	39.9	120	10.2	358	31.7	65	17.8	95	677.6	324
2	Passenger Cars			13.4	1,581	435.0	540	229.3	452	11.7	140							689.4	522
	Light Trucks			13.4	143	435.0	73	229.3	78	11.7	23							689.4	75
	Medium Trucks			13.4	21	435.0	13	229.3	11	11.7	1							689.4	12
	Heavy Trucks			13.4	10	435.0	3	229.3	2	11.7	0							689.4	3
	Tractor-Trucks &																		
	Semi-trailers			13.4	9	435.0	10	229.3	10	11.7	2							689.4	10
	Trucks & Trailers			13.4	5	435.0	5	229.3	7	11.7	1							689.4	6
	School Buses			13.4	2	435.0	1	229.3	1	11.7	0							689.4	1
	Passenger Buses			13.4	28	435.0	8	229.3	6	11.7	0							689.4	8
				13.4	1,799	435.0	653	229.3	567	11.7	167							689.4	637
3	Passenger Care			1.4	952	242.8	369	192.3	264									436.5	322
	Light Trucks			1.4	95	242.8	47	192.3	43									436.5	46
	Medium Trucks			1.4	7	242.8	5	192.3	4									436.5	5
	Heavy Trucks			1.4	2	242.8	1	192.3	1									436.5	1
	Tractor-Trucke &																		
	Semi-trailers			1.4	5	242.8	3	192.3	4									436.5	4
	Trucks & Trailers			1.4	9	242.8	4	192.3	2									436.5	3
	School Busee			1.4	0	242.8	1	192.3	1									436.5	1
	Passenger Buses			1.4	23	242.8	8	192.3	6									436.5	6
				1.4	1,093	242.8	438	192.3	325									436.5	388
4	Passenger Cars							53.0	365									53.0	365
	Light Trucks							53.0	91									53.0	91
	Medium Trucks							53.0	48									53.0	48
	Heavy Trucks							53.0	10									53.0	10
	Tractor-trucke &																		
	Semi-trailers							53.0	57									53.0	57
	Trucke & Trailers							53.0	41									53.0	41
	Passenger Buees							53.0	4									53.0	4
								53.0	616									53.0	616
5	Passenger Cars			0.5	578	89.6	486	85.9	279							8.1	20	184.1	383
	Light Trucks			0.5	115	89.6	84	85.9	53							8.1	3	184.1	66
	Medium Trucke			0.5	13	89.6	10	85.9	5							8.1	0	184.1	8
	Heavy Trucke			0.5	3	89.6	3	85.9	3							8.1	0	184.1	3
	Tractor-trucks &																		
	Semi-trailers			0.5	3	89.6	3	85.9	2							8.1	0	184.1	3
	Trucks & Trailers			0.5	1	89.6	2	85.9	1							8.1	0	184.1	1
	School Buses			0.5	3	89.6	2	85.9	1							8.1	0	184.1	1
	Passenger Buses			0.5	7	89.6	7	85.9	4							8.1	0	184.1	5
				0.5	723	89.6	597	85.9	348							8.1	23	184.1	470

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type: Bituminous Macadam Mi.	Bituminous Macadam Tr.	Concrete Mi.	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Tr.	Unimproved Mi.	Unimproved Tr.	All Types Mi.	All Types Tr.
6	Passenger Cars					30.0	235	85.8	155									115.8	176
	Light Trucks					30.0	50	85.8	37									115.8	41
	Medium Trucks					30.0	7	85.8	5									115.8	5
	Heavy Trucks					30.0	5	85.8	3										3
	Tractor-trucks & Semi-trailers					30.0	2	85.8	2									115.8	2
	Trucks & Trailers					30.0	1	85.8	1									115.8	1
	School Buses					30.0	1	85.8	1									115.8	1
	Passenger Buses					30.0	1	85.8	1									115.8	1
						30.0	302	85.8	205									115.8	230
7	Passenger Cars					60.6	413	6.9	117					23.6	42			91.1	294
	Light Trucks					60.6	108	6.9	32					23.6	15			91.1	79
	Medium Trucks					60.6	8	6.9	1					23.6	1			91.1	6
	Heavy Trucks					60.6	4	6.9	2					23.6	1			91.1	3
	Tractor-trucks & Semi-trailers					60.6	6	6.9	2					23.6	1			91.1	4
	Trucks & Trailers					60.6	4	6.9	1					23.6	1			91.1	3
	Passenger Buses					60.6	3	6.9	1					23.6	1			91.1	3
						60.6	546	6.9	156					23.6	62			91.1	392
8	Passenger Cars					62.1	424	41.9	265									104.0	350
	Light Trucks					62.1	66	41.9	45									104.0	58
	Medium Trucks					62.1	11	41.9	4									104.0	8
	Heavy Trucks					62.1	1	41.9	1									104.0	1
	Tractor-trucks & Semi-trailers					62.1	3	41.9	3									104.0	3
	Trucks & Trailers					62.1	3	41.9	2									104.0	2
	Passenger Buses					62.1	6	41.9	4									104.0	5
						62.1	514	41.9	324									104.0	437
9	Passenger Cars					0.9	70	65.9	63									66.8	63
	Light Trucks					0.9	15	65.9	12									66.8	13
	Medium Trucks					0.9	1	65.9	1									66.8	1
	Tractor-trucks & Semi-trailers					0.9	1	65.9	1									66.8	1
	School Buses					0.9	1	65.9	1									66.8	1
						0.9	88	65.9	78									66.8	79
10	Passenger Cars					0.4	555	110.6	325									111.0	328
	Light Trucks					0.4	82	110.6	62									111.0	62
	Medium Trucks					0.4	3	110.6	6									111.0	6
	Heavy Trucks					0.4	2	110.6	1									111.0	1
	Tractor-trucks & Semi-trailers					0.4	10	110.6	5									111.0	5
	Trucks & Trailers					0.4	2	110.6	1									111.0	1
	School Buses					0.4	0	110.6	1									111.0	1
	Passenger Buses					0.4	5	110.6	4									111.0	4
						0.4	659	110.6	405									111.0	408
11	Passenger Cars	2.9	473	0.1	326	44.6	354	109.8	195	44.3	82	18.7	74			0.3	224	220.7	197
	Light Trucks	2.9	123	0.1	47	44.6	53	109.8	38	44.3	14	18.7	10			0.3	43	220.7	35
	Medium Trucks	2.9	8	0.1	7	44.6	8	109.8	4	44.3	2	18.7	2			0.3	5	220.7	4
	Heavy Trucks	2.9	2	0.1	0	44.6	0	109.8	1	44.3	0	18.7	0			0.3	1	220.7	1
	Tractor-trucks & Semi-trailers	2.9	4	0.1	2	44.6	1	109.8	2	44.3	1	18.7	0			0.3	2	220.7	1
	Trucks & Trailers	2.9	2	0.1	1	44.6	1	109.8	1	44.3	1	18.7	1			0.3	1	220.7	1
	Passenger Buses	2.9	2	0.1	1	44.6	1	109.8	1	44.3	0	18.7	1			0.3	1	220.7	1
		2.9	614	0.1	384	44.6	418	109.8	242	44.3	100	18.7	88			0.3	277	220.7	240

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type: Bituminous Macadam Mi.	Bituminous Macadam Tr.	Concrete Mi.	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Tr.	Unimproved Mi.	Unimproved Tr.	All Types Mi.	All Types Tr.
12	Passenger Cars							9.8	226									9.8	226
	Light Trucks							9.8	30									9.8	30
	Medium Trucks							9.8	4									9.8	4
	Tractor-trucks & Semi-trailers							9.8	3									9.8	3
	Trucks & Trailers							9.8	3									9.8	3
	Passenger Buses							9.8	0									9.8	0
								9.8	266									9.8	266
13	Passenger Cars					15.6	202	90.8	130									106.4	140
	Light Trucks					15.6	33	90.8	20									106.4	22
	Medium Trucks					15.6	2	90.8	3									106.4	3
	Heavy Trucks					15.6	1	90.8	1									106.4	1
	Tractor-trucks & Semi-trailers					15.6	1	90.8	1									106.4	1
	Trucks & Trailers					15.6	0	90.8	1									106.4	1
	School Buses					15.6	1	90.8	1									106.4	1
	Passenger Buses					15.6	0	90.8	1									106.4	1
						15.6	240	90.8	158									106.4	170
14	Passenger Cars					16.1	102	120.0	124	12.7	11	4.1	94	40.6	64	68.2	25	261.7	82
	Light Trucks					16.1	19	120.0	24	12.7	5	4.1	13	40.6	14	68.2	5	261.7	15
	Medium Trucks					16.1	3	120.0	2	12.7	1	4.1	2	40.6	1	68.2	1	261.7	2
	Tractor-trucks & Semi-trailers					16.1	0	120.0	1	12.7	0	4.1	1	40.6	0	68.2	0	261.7	0
	Trucks & Trailers					16.1	0	120.0	1	12.7	0	4.1	0	40.6	1	68.2	0	261.7	1
	School Buses					16.1	0	120.0	1	12.7	1	4.1	0	40.6	0	68.2	0	261.7	1
						16.1	124	120.0	153	12.7	18	4.1	110	40.6	80	68.2	31	261.7	101
15	Passenger Cars			0.3	766	83.0	251	158.2	127	73.6	74			21.9	10	25.5	37	362.5	133
	Light Trucks			0.3	183	83.0	52	158.2	31	73.6	23			21.9	3	25.5	10	362.5	30
	Medium Trucks			0.3	7	83.0	4	158.2	3	73.6	1			21.9	0	25.5	1	362.5	2
	Heavy Trucks			0.3	3	83.0	2	158.2	1	73.6	1			21.9	0	25.5	0	362.5	1
	Tractor-trucks & Semi-trailers			0.3	8	83.0	4	158.2	2	73.6	1			21.9	0	25.5	1	362.5	3
	Trucks & Trailers			0.3	4	83.0	1	158.2	1	73.6	1			21.9	0	25.5	1	362.5	1
	School Buses			0.3	2	83.0	0	158.2	1	73.6	0			21.9	0	25.5	0	362.5	1
	Passenger Buses			0.3	10	83.0	4	158.2	1	73.6	1			21.9	0	25.5	0	362.5	2
				0.3	983	83.0	318	158.2	167	73.6	102			21.9	13	25.5	50	362.5	173
16	Passenger Cars							195.4	289							134.5	19	329.9	173
	Light Trucks							195.4	59							134.5	6	329.9	37
	Medium Trucks							195.4	3							134.5	1	329.9	2
	Heavy Trucks							195.4	1							134.5	0	329.9	1
	Tractor-trucks & Semi-trailers							195.4	8							134.5	0	329.9	5
	Trucks & Trailers							195.4	1							134.5	0	329.9	1
	School Buses							195.4	1							134.5	0	329.9	1
	Passenger Buses							195.4	2							134.5	0	329.9	2
								195.4	364							134.5	26	329.9	222
17	Passenger Cars					7.5	369	67.7	261									75.2	270
	Light Trucks					7.5	52	67.7	43									75.2	44
	Medium Trucks					7.5	4	67.7	3									75.2	3
	Heavy Trucks					7.5	3	67.7	2									75.2	2
	Tractor-trucks & Semi-trailers					7.5	5	67.7	4									75.2	4
	Trucks & Trailers					7.5	3	67.7	2									75.2	2
	School Buses					7.5	0	67.7	1									75.2	1
	Passenger Buses					7.5	4	67.7	4									75.2	4
						7.5	440	67.7	318									75.2	330

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type																	
		Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		All Types	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
18	Passenger Cars							82.8	76									82.8	76
	Light Trucks							82.8	30									82.8	30
	Medium Trucks							82.8	1									82.8	1
	Tractor-trucks & Semi-trailers							82.8	2									82.8	2
	Trucks & Trailers							82.8	2									82.8	2
								82.8	111									82.8	111
19	Passenger Cars			8.0	1,065	42.7	313	12.5	216									63.2	386
	Light Trucks			8.0	141	42.7	46	12.5	37									63.2	56
	Medium Trucks			8.0	15	42.7	4	12.5	4									63.2	6
	Heavy Trucks			8.0	3	42.7	1	12.5	1									63.2	2
	Tractor-trucks & Semi-trailers			8.0	5	42.7	2	12.5	2									63.2	2
	Trucks & Trailers			8.0	3	42.7	1	12.5	1									63.2	2
	School Buses			8.0	3	42.7	1	12.5	1									63.2	2
	Passenger Buses			8.0	11	42.7	6	12.5	5									63.2	6
				8.0	1,246	42.7	374	12.5	267									63.2	462
20	Passenger Cars					13.8	531	48.1	180									61.9	257
	Light Trucks					13.8	140	48.1	64									61.9	82
	Medium Trucks					13.8	4	48.1	3									61.9	3
	Heavy Trucks					13.8	1	48.1	1									61.9	1
	Tractor-trucks & Semi-trailers					13.8	3	48.1	2									61.9	2
	Trucks & Trailers					13.8	2	48.1	2									61.9	2
	School Buses					13.8	1	48.1	1									61.9	1
	Passenger Buses					13.8	2	48.1	2									61.9	2
						13.8	684	48.1	255									61.9	350
21	Passenger Cars							108.3	259									108.3	259
	Light Trucks							108.3	54									108.3	54
	Medium Trucks							108.3	10									108.3	10
	Heavy Trucks							108.3	1									108.3	1
	Tractor-trucks & Semi-trailers							108.3	13									108.3	13
	Trucks & Trailers							108.3	3									108.3	3
	School Buses							108.3	1									108.3	1
	Passenger Buses							108.3	6									108.3	6
								108.3	347									108.3	347
22	Passenger Cars					12.0	110	78.9	146	7.9	82					33.9	15	132.7	103
	Light Trucks					12.0	34	78.9	41	7.9	17					33.9	3	132.7	29
	Medium Trucks					12.0	1	78.9	1	7.9	0					33.9	0	132.7	1
	Tractor-trucks & Semi-trailers					12.0	1	78.9	1	7.9	0					33.9	0	132.7	1
	Trucks & Trailers					12.0	1	78.9	1	7.9	0					33.9	0	132.7	1
	School Buses					12.0	0	78.9	1	7.9	1					33.9	0	132.7	1
	Passenger Buses					12.0	0	78.9	1	7.9	0					33.9	0	132.7	1
						12.0	147	78.9	192	7.9	100					33.9	18	132.7	137
23	Passenger Cars							135.5	63							5.0	134	140.5	65
	Light Trucks							135.5	20							5.0	45	140.5	20
	Medium Trucks							135.5	1							5.0	3	140.5	1
	Heavy Trucks							135.5	1							5.0	1	140.5	1
	Tractor-trucks & Semi-trailers							135.5	4							5.0	10	140.5	5
	Trucks & Trailers							135.5	1							5.0	3	140.5	1
								135.5	90							5.0	196	140.5	93
24	Passenger Cars			0.1	233	4.0	211	32.6	118	3.2	84			1.7	85	123.5	19	165.1	46
	Light Trucks			0.1	52	4.0	31	32.6	25	3.2	12			1.7	11	123.5	2	165.1	7

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type: Bituminous Macadam Mi.	Bituminous Macadam Tr.	Concrete Mi.	Concrete Tr.	High Type Bituminous Mi.	High Type Bituminous Tr.	Low Type Bituminous Mi.	Low Type Bituminous Tr.	Plain Macadam Mi.	Plain Macadam Tr.	Plain Gravel Mi.	Plain Gravel Tr.	Graded & Drained Mi.	Graded & Drained Tr.	Unimproved Mi.	Unimproved Tr.	All Types Mi.	All Types Tr.
24 (Cont'd)	Medium Trucks			0.1	3	4.0	2	32.6	2	3.2	1			1.7	1	123.5	1	165.1	1
	Heavy Trucks			0.1	0	4.0	1	32.6	0	3.2	1			1.7	0	123.5	1	165.1	1
	Tractor-trucks & Semi-trailers			0.1	2	4.0	1	32.6	2	3.2	0			1.7	1	123.5	1	165.1	1
	Trucks & Trailers			0.1	1	4.0	1	32.6	1	3.2	0			1.7	0	123.5	1	165.1	1
	School Buses			0.1	3	4.0	2	32.6	2	3.2	0			1.7	0	123.5	1	165.1	1
	Passenger Buses			0.1	0	4.0	4	32.6	0	3.2	2			1.7	2	123.5	1	165.1	1
				0.1	294	4.0	253	32.6	150	3.2	100			1.7	100	123.5	27	165.1	59
25	Passenger Cars							36.0	85	7.2	47					8.3	34	51.5	71
	Light Trucks							36.0	25	7.2	12					8.3	12	51.5	21
	Medium Trucks							36.0	1	7.2	0					8.3	0	51.5	1
	Tractor-trucks & Semi-trailers							36.0	1	7.2	0					8.3	0	51.5	1
	Trucks & Trailers							36.0	1	7.2	1					8.3	0	51.5	1
								36.0	113	7.2	60					8.3	46	51.5	95
26	Passenger Cars							7.6	69									7.6	69
	Light Trucks							7.6	28									7.6	28
	Medium Trucks							7.6	1									7.6	1
	School Buses							7.6	1									7.6	1
								7.6	99									7.6	99
27	Passenger Cars									36.9	89					1.4	39	38.3	88
	Light Trucks									36.9	28					1.4	13	38.3	27
	Medium Trucks									36.9	1					1.4	1	38.3	1
	Heavy Trucks									36.9	1					1.4	1	38.3	1
	Tractor-trucks & Semi-trailers									36.9	2					1.4	3	38.3	2
	Trucks & Trailers									36.9	1					1.4	1	38.3	1
										36.9	122					1.4	58	38.3	120
28	Passenger Cars					4.2	212	35.1	343									39.3	328
	Light Trucks					4.2	43	35.1	60									39.3	58
	Medium Trucks					4.2	4	35.1	8									39.3	8
	Heavy Trucks					4.2	0	35.1	2									39.3	2
	Tractor-trucks & Semi-trailers					4.2	2	35.1	2									39.3	2
	Trucks & Trailers					4.2	1	35.1	2									39.3	2
						4.2	262	35.1	417									39.3	400
29	Passenger Cars			0.1	121	15.4	117	0.1	21	15.9	94	8.9	89			22.8	109	63.2	99
	Light Trucks			0.1	29	15.4	21	0.1	3	15.9	22	8.9	14			22.8	20	63.2	24
	Medium Trucks			0.1	4	15.4	5	0.1	1	15.9	4	8.9	2			22.8	3	63.2	3
	Heavy Trucks			0.1	2	15.4	1	0.1	0	15.9	2	8.9	1			22.8	1	63.2	1
	Tractor-trucks & Semi-trailers			0.1	0	15.4	1	0.1	0	15.9	0	8.9	0			22.8	0	63.2	1
	Trucks & Trailers			0.1	1	15.4	0	0.1	0	15.9	1	8.9	0			22.8	1	63.2	1
	School Buses			0.1	3	15.4	0	0.1	0	15.9	2	8.9	0			22.8	1	63.2	1
				0.1	160	15.4	145	0.1	25	15.9	125	8.9	106			22.8	135	63.2	130
30	Passenger Cars									10.1	70					16.3	52	26.4	59
	Light Trucks									10.1	23					16.3	17	26.4	19
	Medium Trucks									10.1	1					16.3	1	26.4	1
	Tractor-trucks & Semi-trailers									10.1	1					16.3	1	26.4	1
	Trucks & Trailers									10.1	1					16.3	1	26.4	1
										10.1	96					16.3	72	26.4	81

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type																All Types	
		Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved			
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
31	Passenger Cars					13.8	66											13.8	66
	Light Trucks					13.8	16											13.8	16
	Medium Trucks					13.8	1											13.8	1
	Tractor-trucks & Semi-trailers					13.8	1											13.8	1
	Passenger Buses					13.8	1											13.8	1
						13.8	85											13.8	85
32	Passenger Cars					50.8	96											50.8	96
	Light Trucks					50.8	22											50.8	22
	Medium Trucks					50.8	1											50.8	1
	Tractor-trucks & Semi-trailers					50.8	1											50.8	1
	Passenger Buses					50.8	1											50.8	1
						50.8	118											50.8	118
33	Passenger Cars									20.7	42	21.2	39			23.0	62	64.9	48
	Light Trucks									20.7	12	21.2	13			23.0	19	64.9	15
	Medium Trucks									20.7	1	21.2	1			23.0	1	64.9	1
	Heavy Trucks									20.7	1	21.2	1			23.0	1	64.9	1
	School Buses									20.7	1	21.2	1			23.0	1	64.9	1
										20.7	57	21.2	55			23.0	84	64.9	66
34	Passenger Cars															27.3	3	27.3	3
	Light Trucks															27.3	2	27.3	2
	School Buses															27.3	1	27.3	1
																27.3	6	27.3	6
35	Passenger Cars									6.3	35			30.1	31	20.8	36	57.2	34
	Light Trucks									6.3	11			30.1	10	20.8	12	57.2	10
	Medium Trucks									6.3	0			30.1	0	20.8	0	57.2	0
	Heavy Trucks									6.3	1			30.1	1	20.8	1	57.2	1
	Tractor-trucks & Semi-trailers									6.3	1			30.1	1	20.8	1	57.2	1
	Trucks & Trailers									6.3	1			30.1	1	20.8	1	57.2	1
										6.3	49			30.1	44	20.8	51	57.2	47
36	Passenger Cars									6.4	58			10.7	28	34.8	51	51.9	49
	Light Trucks									6.4	26			10.7	11	34.8	23	51.9	20
	Medium Trucks									6.4	1			10.7	1	34.8	1	51.9	1
	Heavy Trucks									6.4	1			10.7	1	34.8	1	51.9	1
	Tractor-trucks & Semi-trailers									6.4	3			10.7	1	34.8	3	51.9	2
	School Buses									6.4	0			10.7	1	34.8	1	51.9	1
	Paasenger Buses									6.4	1			10.7	1	34.8	1	51.9	1
										6.4	90			10.7	44	34.8	81	51.9	75
37	Passenger Cars													32.3	17	83.8	18	116.1	18
	Light Trucks													32.3	11	83.8	11	116.1	11
														32.3	28	83.8	29	116.1	29
38	Passenger							1.7	156			3.2	179			3.7	183	8.6	176
	Light Trucks							1.7	30			3.2	34			3.7	35	8.6	33
	Medium Trucks							1.7	3			3.2	3			3.7	3	8.6	3
	Tractor-trucks & Semi-trailers							1.7	1			3.2	1			3.7	1	8.6	1
	School Buses							1.7	1			3.2	1			3.7	1	8.6	1
								1.7	191			3.2	218			3.7	223	8.6	214

Table 40A (Continued)

F. A. Route No.	Vehicle Classification	Surface Type																All Types	
		Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved			
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
39	Passenger Cars									14.3	60							14.3	60
	Light Trucks									14.3	13							14.3	13
	Medium Trucks									14.3	1							14.3	1
	Tractor-trucks & Semi-trailers									14.3	1							14.3	1
										14.3	75							14.3	75
40	Passenger Cars					1.4	591											1.4	591
	Light Trucks					1.4	86											1.4	86
	Medium Trucks					1.4	4											1.4	4
	Heavy Trucks					1.4	2											1.4	2
	Tractor-trucks & Semi-trailers					1.4	11											1.4	11
	Trucks & Trailers					1.4	2											1.4	2
	Passenger Buses					1.4	5											1.4	5
						1.4	701											1.4	701
41	Passenger Cars					2.0	365											2.0	365
	Light Trucks					2.0	94											2.0	94
	Medium Trucks					2.0	6											2.0	6
	Heavy Trucks					2.0	1											2.0	1
	Tractor-trucks & Semi-trailers					2.0	3											2.0	3
	Trucks & Trailers					2.0	1											2.0	1
	Passenger Buses					2.0	1											2.0	1
						2.0	471											2.0	471
42	Passenger Cars					17.6	1387									57.2	38	74.8	356
	Light Trucks					17.6	422									57.2	11	74.8	107
	Medium Trucks					17.6	9									57.2	0	74.8	2
	School Buses					17.6	9									57.2	0	74.8	2
						17.6	1827									57.2	49	74.8	467
43	Passenger Cars			1.2	654			14.2	245	21.8	63					8.4	49	45.6	132
	Light Trucks			1.2	149			14.2	57	21.8	16					8.4	13	45.6	32
	Medium Trucks			1.2	7			14.2	3	21.8	1					8.4	1	45.6	2
	Heavy Trucks			1.2	3			14.2	1	21.8	1					8.4	1	45.6	1
	Tractor-trucks & Semi-trailers			1.2	2			14.2	1	21.8	1					8.4	1	45.6	1
	Trucks & Trailers			1.2	2			14.2	1	21.8	1					8.4	1	45.6	1
	School Buses			1.2	5			14.2	2	21.8	1					8.4	1	45.6	1
				1.2	822			14.2	310	21.8	84					8.4	67	45.6	170
44	Passenger Cars															14.0	69	14.0	69
	Light Trucks															14.0	13	14.0	13
	Medium Trucks															14.0	1	14.0	1
	Tractor-trucks & Semi-trailers															14.0	1	14.0	1
	Trucks & Trailers															14.0	1	14.0	1
	Passenger Buses															14.0	1	14.0	1
																14.0	86	14.0	86
All Routes	Passenger Cars	2.9	473	25.1	1295	1363.0	409	2697.6	234	332.9	75	66.3	102	192.6	37	738.6	31	5419.0	237
	Light Trucks	2.9	123	25.1	137	1363.0	66	2697.6	48	332.9	19	66.3	22	192.6	12	738.6	9	5419.0	45
	Medium Trucks	2.9	8	25.1	17	1363.0	8	2697.6	5	332.9	1	66.3	2	192.6	1-	738.6	1-	5419.0	5
	Heavy Trucks	2.9	2	25.1	7	1363.0	2	2697.6	1	332.9	1-	66.3	1-	192.6	1-	738.6	1-	5419.0	1
	Tractor-trucks & Semi-trailers	2.9	4	25.1	7	1363.0	5	2697.6	4	332.9	1	66.3	1-	192.6	1-	738.6	1-	5419.0	4
	Trucks & Trailers	2.9	2	25.1	4	1363.0	3	2697.6	2	332.9	1-	66.3	1-	192.6	1-	738.6	1-	5419.0	2
	School Buses	2.9	0	25.1	2	1363.0	1	2697.6	1	332.9	1-	66.3	1-	192.6	1-	738.6	1-	5419.0	1
	Passenger Buses	2.9	2	25.1	20	1363.0	6	2697.6	3	332.9	1-	66.3	1-	192.6	1-	738.6	1-	5419.0	3
		2.9	614	25.1	1489	1363.0	500	2697.6	298	332.9	99	66.3	129	192.6	52	738.6	43	5419.0	298

INCIDENCE OF COMMERCIAL TRAFFIC IN THE HIGHER VOLUMES
BY SURFACE TYPES.

Bituminous Macadam

F.A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
11	2.9	Cascade	473	123	8	2	4	2	1-	2	614

Concrete

F.A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
2	0.1	Mineral	411	53	4	2	4	5	1-	7	487
	0.1	Missoula	1395	159	15	5	10	5	3	23	1627
	13.0	Silver Bow	1509	143	21	10	9	5	2	29	1828
	0.2	Yellowstone	593	152	8	3	10	7	1-	5	879
	13.4		1581	143	21	10	9	5	2	28	1799
3	1.4	Silver Bow	952	95	7	2	5	9	1-	23	1093
5	0.5	Lake	578	115	13	3	3	1	3	7	723
15	0.3	Dawson	766	183	7	3	8	4	2	10	983
19	8.0	Deer Lodge	1065	141	15	3	5	3	3	11	1246
43	1.2	Fergus	554	149	7	3	2	2	5	1-	822
	24.8		1303	140	17	7	7	4	2	20	1500

High Type Bituminous

F.A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
1	3.2	Glacier	438	77	5	1	4	3	1-	5	534
	22.4	Hill	355	92	4	1-	3	2	1-	2	459
	18.5	Blaine	355	97	4	1-	4	1	1-	2	454
	24.7	Phillips	325	55	3	1-	3	1-	1-	3	400
	2.8	Valley	433	87	3	1-	4	1	2	2	532
	71.7		357	84	5	1-	5	1	1	3	458
2	29.2	Mineral	435	54	5	2	4	6	1-	8	516
	51.4	Missoula	770	98	13	5	7	5	2	11	911
	71.9	Granite	595	55	12	4	7	5	1	9	700
	34.2	Powell	577	75	5	3	5	4	1	14	586
	15.3	Deer Lodge	646	51	5	9	5	3	1-	12	641
	7.5	Silver Bow	854	77	12	5	5	3	1	15	982
	41.4	Jefferson	533	59	12	5	5	3	2	7	617
	4.7	Broadwater	390	57	11	2	8	4	1-	7	479
	41.2	Gallatin	747	102	25	3	12	6	2	11	908
	29.9	Park	507	64	15	2	11	5	1	5	612
	36.4	Sweet Grass	449	57	19	2	12	5	1-	3	557
	38.1	Stillwater	485	79	17	1	18	8	1-	8	516
	10.3	Yellowstone	552	90	17	4	19	7	1-	9	598
	17.7	Treasure	300	53	7	3	12	6	1-	6	397
	25.5	Rosebud	357	53	7	2	12	5	2	6	454
	19.9	Custer	405	69	8	2	13	5	2	7	512
	420.6		552	74	13	3	10	5	1	8	586
3	40.4	Cascade	421	53	9	1	5	5	1-	13	517
	25.5	Lewis & Clark	395	46	7	2	4	6	1	13	474
	51.4	Jefferson	493	44	5	2	2	5	1	13	565
	32.3	Silver Bow	402	45	5	1	4	3	1	5	487
	149.6		437	50	6	2	4	5	1	11	518
5	32.1	Flathead	544	73	9	2	2	1	1	6	638
	53.5	Lake	452	93	10	3	3	2	2	7	572
	4.0	Missoula	494	75	17	9	7	3	1-	8	613
	89.6		486	84	10	3	3	2	2	7	597
6	25.5	Sanders	220	51	5	4	2	1	1	1	285
	1.1	Lake	231	52	3	2	2	1	1-	2	303
	27.7		220	52	5	4	2	1	1	1	286
7	16.4	Missoula	533	133	17	5	10	3	1-	6	707
	44.2	Ravalli	389	99	4	4	5	4	1-	2	487
	60.6		413	108	8	4	5	4	1-	3	548
8	22.1	Lewis & Clark	589	93	18	1	4	4	1-	8	716
	1.5	Jefferson	499	130	27	1-	4	3	1-	3	868
	10.8	Broadwater	332	79	15	1-	3	2	1-	2	424
	34.4		500	91	18	1	4	3	1-	4	821
10	0.4	Cascade	555	82	3	2	10	2	1-	5	569
11	0.8	Cascade	511	70	10	3	5	4	1-	4	807
	11.1	Park	506	73	11	1-	2	1	1-	2	595
	11.9		506	73	11	1-	2	1	1-	2	595
15	33.0	Fergus	297	52	5	2	7	2	1-	4	379
	20.4	Dawson	213	55	2	1	2	1	1	3	279
	53.4		264	69	4	2	5	2	1-	4	340
17	7.5	Custer	369	52	4	3	5	3	1-	4	440
19	7.0	Granite	274	53	3	2	3	1	1	4	341
	5.0	Deer Lodge	770	78	10	3	2	1	1	11	876
	12.0		481	53	5	2	3	1	1	7	584
20	13.8	Richland	531	140	4	1	3	2	1	2	684
24	0.9	Missoula	583	83	5	3	3	2	3	13	895
40	1.4	Cascade	591	86	4	2	11	2	1-	5	701
41	2.0	Cascade	365	94	8	1	3	1	1-	1	471
42	17.5	Valley	1387	422	9	1-	1-	1-	9	1-	1827
All Routes	975.1		489	80	10	3	7	4	1	7	601

Low Type Bituminous

F.A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
1	31.9	Flathedd	399	85	2	3	4	2	1-	1	498
	7.8	Glacier	599	100	18	1-	20	1	1-	4	742
	27.9	Toole	304	54	10	1	8	1	1-	2	380
	35.1	Hill	282	68	3	1-	2	1	1-	2	358
	32.1	Blaine	412	113	4	1-	5	1	1-	3	538
	28.8	Phillips	285	63	2	1-	2	1	1-	2	336
	77.3	Valley	454	86	3	1-	5	1	2	2	553
	54.2	Roosevelt	294	59	2	1-	2	1	1-	2	370
	305.1		382	79	4	1-	4	1	1-	2	452
2	49.8	Mineral	474	59	5	2	5	5	1-	8	559
	8.5	Missoula	387	53	8	2	3	5	1-	5	443
	8.7	Granite	821	59	13	4	8	5	1-	10	731
	3.9	Silver Bow	1478	129	12	13	7	5	1-	32	1674
	1.5	Gallatin	847	111	31	2	13	7	3	11	1025
	89.3	Yellowstone	733	144	25	4	25	15	1	10	958
	15.3	Rosebud	341	55	7	2	9	5	1-	5	436
	155.0		605	100	18	1	14	10	1	9	757
3	31.3	Cascade	507	90	10	1	13	3	1	4	629
	25.6	Lewis & Clark	522	82	8	1	4	4	1	13	615
	4.8	Jefferson	584	71	8	2	3	5	1-	13	786
	15.5		526	77	9	1	9	4	1	8	635
4	3.3	Yellowstone	521	125	59	8	63	47	1-	5	926
	49.7	Carbon	348	89	47	10	57	41	1-	4	598
	53.0		385	91	48	10	57	41	1-	4	516
5	24.1	Lake	463	100	9	4	4	3	2	8	593
	11.3	Missoula	481	73	18	8	5	3	1-	8	595
	35.4		459	93	12	6	5	3	1	4	593
6	34.5	Sanders	281	87	8	4	1	1	1	1	362
8	22.3	Broadwater	315	59	4	1	3	2	1-	3	387
10	23.4	Hill	278	51	5	1	8	1	1-	3	347
	71.3	Chouteau	333	67	7	1	3	1	2	5	419
	15.9	Cascade	390	53	2	1	7	1	1-	3	427
	110.8		325	82	5	1	5	1	1	4	405
11	18.0	Cascade	494	105	9	3	5	3	1-	3	522
15	1.5	Fergus	285	74	4	1	8	3	1-	5	380
	1.1	Dawson	540	141	5	2	5	3	1	7	785
	2.6		392	103	4	1	7	3	1-	8	518
18	25.4	Musselshell	325	51	4	1	4	1	1	2	399
	45.5	Yellowstone	315	58	5	2	7	3	1	3	404
	78.5	Big Horn	334	64	2	1	12	1	1	2	416
	149.5		325	55	3	1	9	2	1	2	409
17	36.4	Prairie	289	48	3	2	5	2	1	4	354
18	0.6	Custer	209	82	4	1-	2	2	1-	1-	299
20	24.8	Richland	222	78	4	1	3	2	1	2	313
21	43.2	Toole	226	52	12	1-	8	2	1-	7	307
	31.2	Pondera	268	57	10	1	16	3	1	5	352
	22.1	Teton	278	56	8	1	18	5	1-	5	372
	11.8	Cascade	357	63	10	1	11	3	1	3	429
	108.3		259	54	10	1	13	3	1	5	347
28	30.6	Carbon	355	61	8	2	2	2	1-	1-	430
43	14.2	Fergus	244	57	3	1	1	1	2	1-	310
All Routes	1151.8		380	75	9	1	8	5	1	4	483

Plain Macadam

F.A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
15	12.8	Fergus	194	50	3	1	7	2	1-	4	261
	12.8		194	50	3	1	7	2	1-	4	261

Plain Gravel

F. A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
1	3.4	Blaine	567	154	5	1-	7	1	1-	4	738
	3.4		567	154	5	1-	7	1	1-	4	738

Graded & Drained

F. A. Route No.	Length	County	Traffic Data 1	2	3	4	5	6	7	8	Total
23	5.0	Powder	134	45	3	1	10	3	1-	1-	196
	5.0	River	134	45	3	1	10	3	1-	1-	196

LEGEND: Traffic Data

1. Passenger Cars
2. Light Trucks
3. Medium Trucks
4. Heavy Trucks
5. Tractor Trucks & Semi-Trailers
6. Trucks & Trailers
7. School Buses
8. Passenger Buses

In all, there are 2,185.4 miles of the Federal Aid System which bear more than the average commercial traffic volume. (61, see Table 40A)

As traffic increases in volume the truck and bus volumes decrease in terms of percentage. For example, on the Land Service System the truck and bus traffic constitutes about 31.5% of the total traffic, while on the Federal Aid System, truck and bus traffic comprises about 20% of the whole. The variation in percentages manifest depends on traffic volumes and the type of surface is not a function to be considered in the analysis.

3.03 Classification of Physical Features in Connection With Design Requirements

Among the important features of design requirements, are consideration of an adequate foundation to preclude entry of surface deterioration, particularly on the Federal Aid System. Truck and bus traffic presents the possibility for extreme in regard to loads imposed, hence the sections following hereafter will treat with the incidence of critical loads occasioned by passage of these units.

3.031--Normal Frequencies of Gross Loads, Truck and Bus Traffic

Tables 41A, 41B, 41C, 41D, and 41E as follows show the incidence of loads along the Federal Aid System classified in groups, light (less than 5,000 pounds gross) medium (from 5,000 to 10,000 pounds gross,) and heavy (over 10,000 pounds gross).

The rated capacities govern as follows:

Light - 1½ tons and less.
Medium - Over 1½ tons and less than 5 tons.
Heavy - 5 tons and over.

Weight restrictions now in effect in the state are as follows:

2 axle truck total weight not more than 24,000 pounds, not more than 16,800 pounds on any one axle.
3-axle truck, total weight not more than 34,000 pounds, not more than 13,000 pounds on any one axle.
2 axle tractor-truck, same as 2 axle truck.
3 axle tractor-truck, same as 3 axle truck.
Single axle semi-trailer, not more than 16,800 pounds on the axle.
2 axle semi-trailer, total weight not more than 24,000 pounds, nor more than 13,000 pounds on any one axle.
Trailers, same as trucks.

Table 41A

INCIDENCE OF SINGLE UNIT TRUCKS ALONG FEDERAL AID SYSTEM

CLASSIFIED BY GROSS LOADS IMPOSED, LOADED AND EMPTY

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	677.6	Light	0-4,999	21.70	0.03		6.48			28.18	0.03	
		Medium	5,000-9,999	11.38	0.73	0.05	10.82	0.24		22.20	0.97	0.05
		Heavy	10,000-14,999	.02	0.47	0.10	5.93	0.77	0.09	5.95	1.24	0.19
			15,000-19,999	.01	0.05	0.03	1.52	0.44	0.24	1.53	0.49	0.27
			20,000-24,999		0.01	0.01	0.14	0.11	0.19	0.14	0.12	0.20
			25,000-29,999					0.07	0.24		0.07	0.24
			30,000-34,999					0.08			0.08	
			35,000-39,999						0.05			0.05
				33.11	1.29	0.19	24.89	1.71	0.81	58.00	3.00	1.00
2	79.4	Light	0-4,999	25.32	0.13		9.19	0.02		34.51	0.15	
		Medium	5,000-9,999	13.40	2.96	0.26	13.32	0.83	0.05	26.72	3.79	0.31
		Heavy	10,000-14,999	0.20	1.84	0.53	10.00	1.86	0.19	10.20	3.70	0.72
			15,000-19,999	0.04	.18	.19	2.85	1.74	0.32	2.89	1.92	0.51
			20,000-24,999		.05	.05	0.48	1.14	0.54	0.48	1.19	0.59
			25,000-29,999			.02	0.19	0.90	0.44	0.19	0.90	0.46
			30,000-34,999					0.30	0.29		0.30	0.29
			35,000-39,999				0.01	0.05	0.07	0.01	0.05	0.07
			40,000-44,999						0.05			0.05
				38.96	5.16	1.05	36.04	6.84	1.95	75.00	12.00	3.00
3	436.5	Light	0-4,999	17.51	0.05		6.83			24.34	0.05	
		Medium	5,000-9,999	9.25	1.12	0.08	7.51	0.28	0.02	16.76	1.40	0.10
		Heavy	10,000-14,999	0.13	.69	0.17	3.76	0.94	0.02	3.89	1.63	0.19
			15,000-19,999	0.03	.07	.06	0.92	0.83	0.14	0.95	0.90	0.20
			20,000-24,999		.02	.01	0.03	0.57	0.12	0.03	0.59	0.13
			25,000-29,999			.01	0.03	0.27	0.16	0.03	0.27	0.17
			30,000-34,999					0.11	0.14		0.11	0.14
			35,000-39,999					0.05	0.07		0.05	0.07
				26.92	1.95	0.33	19.08	3.05	0.67	46.00	5.00	1.00
4	53.0	Light	0-4,999	30.30	0.55		10.41			40.71	0.55	
		Medium	5,000-9,999	16.04	12.15	0.83	16.98	2.95		33.02	15.10	0.83
		Heavy	10,000-14,999	0.23	7.55	1.70	11.54	5.01	1.33	11.77	12.56	3.03
			15,000-19,999	.05	0.74	0.59	4.17	3.83		4.22	4.57	0.59
			20,000-24,999		0.21	.15	0.80	4.71	3.34	0.80	4.92	3.49
			25,000-29,999			.06	0.48	7.36	2.00	0.48	7.36	2.06
			30,000-34,999					2.36			2.36	
			35,000-39,999					0.29			0.29	
			55,000-59,999					0.29			0.29	
				46.62	21.20	3.33	44.38	26.80	6.67	91.00	48.00	10.00
5	184.1	Light	0-4,999	22.41	0.07		9.97			32.38	0.07	
		Medium	5,000-9,999	11.86	1.54	0.32	15.21	1.18		27.07	2.72	0.32
		Heavy	10,000-14,999	.17	0.95	0.66	5.17	2.47	0.43	5.34	3.42	1.09
			15,000-19,999	.06	0.09	0.23	1.02	0.75		1.08	0.84	0.23
			20,000-24,999		.03	0.06	0.13	0.81	0.85	0.13	0.84	0.91
			25,000-29,999			0.02		0.11			0.11	0.02
			30,000-34,999						0.43			0.43
				34.50	2.68	1.29	31.50	5.32	1.71	66.00	8.00	3.00
6	115.8	Light	0-4,999	12.78	0.06		5.75			18.53	0.06	
		Medium	5,000-9,999	6.77	1.24	0.75	10.02	0.50		16.79	1.74	0.75
		Heavy	10,000-14,999	0.10	0.79	1.53	4.82	2.33		4.92	3.12	1.53
			15,000-19,999	0.02	0.08	.72	0.74			0.76	0.08	0.72
				19.67	2.17	3.00	21.33	2.83		41.00	5.00	3.00

Table 41A(Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
7	91.1	Light	0-4,999	21.52	0.04		10.28			31.80	0.04	
		Medium	5,000-9,999	11.40	0.84	0.37	21.94	1.75		33.34	2.59	0.37
		Heavy	10,000-14,999	0.17	0.52	0.76	9.82	2.05		9.99	2.57	0.76
			15,000-19,999	0.04	0.05	0.28	1.07	0.15	0.90	1.11	0.20	1.17
			20,000-24,999		0.01	0.07	.99	0.44		0.99	0.45	0.07
			25,000-29,999			0.03	.77	0.15	0.60	0.77	0.15	0.63
				33.13	1.46	1.50	44.87	4.54	1.50	78.00	6.00	3.00
8	104.0	Light	0-4,999	21.22	0.13		9.05			30.27	0.13	
		Medium	5,000-9,999	11.23	2.89		8.31	0.49		19.54	3.38	
		Heavy	10,000-14,999	0.16	1.80		5.61	1.10		5.77	2.90	
			15,000-19,999	0.03	0.18		2.18	1.11	0.29	2.21	1.29	0.29
			20,000-24,999		0.05		0.21		0.28	0.21	0.05	0.28
			25,000-29,999					0.25	0.14		0.25	0.14
			30,000-34,999						0.29			0.29
				32.64	5.05		25.36	2.95	1.00	58.00	8.00	1.00
9	66.8	Light	0-4,999	5.68	0.01		1.57			7.25	0.01	
		Medium	5,000-9,999	3.01	0.21		2.11	0.21		5.12	0.42	
		Heavy	10,000-14,999	0.04	0.13		0.51	0.21		0.55	0.34	
			15,000-19,999	0.01	0.01		0.07	0.22		0.08	0.23	
				8.74	0.36		4.26	0.64		13.00	1.00	
10	111.0	Light	0-4,999	20.00	0.05		7.88			27.88	0.05	
		Medium	5,000-9,999	10.57	1.22	0.12	11.56	0.44		22.13	1.66	0.12
		Heavy	10,000-14,999	0.15	0.75	0.22	9.84	1.45		9.99	2.20	0.22
			15,000-19,999	0.03	0.07	0.08	1.85	1.22		1.88	1.29	0.08
			20,000-24,999		0.02	0.01	0.12	0.78	0.21	0.12	0.80	0.22
			25,000-29,999						0.29			0.29
			35,000-39,999						0.07			0.07
				30.75	2.11	0.43	31.25	3.89	0.57	62.00	6.00	1.00
11	220.7	Light	0-4,999	12.20	0.05		4.39			16.59	0.05	
		Medium	5,000-9,999	6.45	1.10	0.09	6.55	0.27	0.09	13.00	1.37	0.18
		Heavy	10,000-14,999	0.09	0.69	0.18	4.35	0.41		4.44	1.10	0.18
			15,000-19,999	0.02	0.07	0.06	0.87	1.12		0.89	1.19	0.06
			20,000-24,999		0.02	0.02		0.18			0.20	0.02
			25,000-29,999			0.01		0.05	0.46		0.05	0.47
			30,000-34,999				0.04	0.04	0.09	0.04	0.04	0.09
			40,000-44,999				0.04			0.04		
				18.76	1.93	0.36	16.24	2.07	0.64	35.00	4.00	1.00
12	9.8	Light	0-4,999	13.59	0.06		3.57			17.16	0.06	
		Medium	5,000-9,999	7.20	1.34		3.57	0.67		10.77	2.01	
		Heavy	10,000-14,999	0.10	0.83		1.65			1.75	0.83	
			15,000-19,999	0.01	0.08		0.31	0.67		0.32	0.75	
			20,000-24,999		0.02			0.33			0.35	
				20.90	2.33		9.10	1.67		30.00	4.00	
13	106.4	Light	0-4,999	8.05	0.03		2.75			10.80	0.03	
		Medium	5,000-9,999	4.25	0.57		3.96	0.67		8.21	1.24	
		Heavy	10,000-14,999	.06	0.36		2.92	0.67	2.00	2.98	1.03	2.00
			15,000-19,999	.01	0.04			0.66		0.01	0.70	
				12.37	1.00		9.63	2.00	2.00	22.00	3.00	2.00
14	261.7	Light	0-4,999	7.22			1.25			8.47		
		Medium	5,000-9,999	3.82			1.39			5.21		
		Heavy	10,000-14,999	0.06			1.11			1.17		
			15,000-19,999	0.01			0.14			0.15		
				11.11			3.89			15.00		
15	362.5	Light	0-4,999	10.12	0.02		3.74			13.86	0.02	
		Medium	5,000-9,999	5.36	0.52	0.07	4.52	0.03		9.88	0.55	0.07
		Heavy	10,000-14,999	0.08	0.32	0.13	5.50	0.38		5.58	0.70	0.13
			15,000-19,999	0.02	0.03	0.05	0.54	0.40	0.09	0.56	0.43	0.14

Table 41A (Continued)

F.A. Route No.	Length	Weight Groups		Empty Weight Dete			Loeded Weight Data			Gross Totels		
				Rated Capecity			Rated Cepacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Cle.s'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
15 (Cont'd)			20,000-24,999		0. 2	0.01	0.12	0.17	0.22	0.12	0.19	0.23
			25,000-29,999					0.06	0.22		0.06	0.22
			30,000-34,999					0.04	0.17		0.04	0.17
			35,000-39,999					0.01	0.04		0.01	0.04
				15.58	0.91	0.26	14.42	1.09	0.74	30.00	2.00	1.00
16	329.9	Light	0-4,999	12.52	0.02		2.88			15.40	0.02	
		Medium	5,000-9,999	6.63	0.40	0.14	6.71	0.20		13.34	0.60	0.14
		Heavy	10,000-14,999	0.11	0.25	0.28	6.53	0.36		6.64	0.61	0.28
			15,000-19,999	0.02	0.02	0.10	1.27	0.31		1.29	0.33	0.10
			20,000-24,999		0.00	0.-3	0.27	0.26	0.25	0.27	0.26	0.28
			25,000-29,999			0.01	0.03	0.12	0.13	0.03	0.12	0.14
			30,000-34,999					0.05			0.05	
			35,000-39,999				0.03	0.01		0.03	0.01	
			40,000-44,999						0.06			0.06
				19.28	0.69	0.56	17.72	1.31	0.44	37.00	2.00	1.00
17	75.2	Light	0-4,999	15.50	0.03		5.59			21.09	0.03	
		Medium	5,000-9,999	8.20	0.76	0.13	6.87	0.10		15.07	0.86	0.13
		Heavy	10,000-14,999	0.12	0.47	0.28	5.96	0.33	0.11	6.08	0.80	0.39
			15,000-19,999	0.01	0.05	0.09	1.47	0.52	0.21	1.48	0.57	0.30
			20,000-24,999		0.02	0.02	0.28	0.43	0.31	0.28	0.45	0.33
			25,000-29,999			0.01		0.19	0.11		0.19	0.12
			30,000-34,999					0.05	0.31		0.05	0.31
			35,000-39,999					0.05	0.31		0.05	0.31
			40,000-44,999						0.11			0.11
				23.83	1.33	0.53	20.17	1.67	1.47	44.00	3.00	2.00
18	82.8	Light	0-4,999	8.72	0.02		1.20			9.92	0.02	
		Medium	5,000-9,999	4.62	0.35		3.92			8.54	0.35	
		Heevy	10,000-14,999	0.07	0.22		7.54			7.61	0.22	
			15,000-19,999	0.01	0.02		3.47	0.23		3.48	0.25	
			20,000-24,999		0.01		0.45	0.15		0.45	0.16	
				13.42	0.62		16.58	0.38		30.00	1.00	
19	63.2	Light	0-4,999	17.36	0.04		8.79			26.15	0.04	
		Medium	5,000-9,999	9.22	0.96	0.25	13.00	0.98		22.22	1.94	0.25
		Heavy	10,000-14,999	0.13	0.59	0.51	6.17	1.87		6.30	2.46	0.51
			15,000-19,999	0.03	0.06	0.18	1.21	0.98	0.14	1.24	1.04	0.32
			20,000-24,999		0.02	0.04	0.09	0.20	0.43	0.09	0.22	0.47
			25,000-29,999			0.02		0.30	0.29		0.30	0.31
			30,000-34,999						0.14			0.14
				26.74	1.67	1.00	29.26	4.33	1.00	56.00	6.00	2.00
20	61.9	Light	0-4,999	35.77	0.04		3.34			39.11	0.04	
		Medium	5,000-9,999	18.92	0.90		13.37	0.27		32.29	1.17	
		Heevy	10,000-14,999	0.28	0.57		8.61	0.44		8.89	1.01	
			15,000-19,999	.04	0.06		0.77	0.44		0.81	0.50	
			20,000-24,999		0.02		0.90	0.26	1.00	0.90	0.28	1.00
				55.01	1.59		26.99	1.41	1.00	82.00	3.00	1.00
21	108.3	Light	0-4,999	17.80	0.09		5.16			22.96	0.09	
		Medium	5,000-9,999	9.43	1.93	0.08	11.92	0.39		21.35	2.32	0.08
		Heavy	10,000-14,999	0.14	1.20	0.16	4.63	1.56	0.08	4.77	2.76	0.24
			15,000-19,999	0.03	0.13	0.06	4.62	2.98	0.08	4.65	3.11	0.14
			20,000-24,999		0.03	0.01	0.27	0.91	0.15	0.27	0.94	0.16
			25,000-29,999					0.39	0.30		0.39	0.30
			30,000-34,999					0.39	0.08		0.39	0.08
				27.40	3.38	0.31	26.60	6.62	0.69	54.00	10.00	1.00

Table 41A (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
	Miles	Class'n	Class Intervals	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.
22	132.7	Light	0-4,999	10.45	0.02		2.72			13.17	0.02	
		Medium	5,000-9,999	5.53	0.33		5.89			11.42	0.33	
		Heavy	10,000-14,999	0.08	0.21		3.17	0.17		3.25	0.38	
			15,000-19,999	0.03	0.02		1.13	0.17		1.16	0.19	
			20,000-24,999		0.00			0.08			0.08	
				16.09	0.58		12.91	0.42		29.00	1.00	
23	140.5	Light	0-4,999	7.19	0.02		0.66			7.85	0.02	
		Medium	5,000-9,999	3.81	0.36		2.11			5.92	0.36	
		Heavy	10,000-14,999	0.06	0.22		4.06			4.12	0.22	
			15,000-19,999	0.00	0.02		1.87	0.23		1.67	0.25	
			20,000-24,999		0.00		0.24	0.15		0.24	0.15	
				11.06	0.62		8.94	0.38		20.00	1.00	
24	165.1	Light	0-4,999	2.99	0.01		1.01			4.00	0.01	
		Medium	5,000-9,999	1.58	0.25		1.08	0.19		2.66	0.44	
		Heavy	10,000-14,999	0.02	0.16		0.26	0.19		0.28	0.35	
			15,000-19,999	0.01	0.02		0.05	0.18		0.06	0.20	
				4.60	0.44		2.40	0.56		7.00	1.00	
25	51.5	Light	0-4,999	9.83			1.40			11.23		
		Medium	5,000-9,999	5.20			1.96			7.16		
		Heavy	10,000-14,999	0.08			1.68			1.76		
			15,000-19,999	0.01			0.84			0.85		
			30,000-34,999					1.00			1.00	
				15.12			5.88	1.00		21.00	1.00	
26	7.6	Light	0-4,999	12.36	0.01		1.01			13.37	0.01	
		Medium	5,000-9,999	6.56	0.29		5.42	0.17		11.98	0.46	
		Heavy	10,000-14,999	0.09	0.18		1.95			2.04	0.10	
			15,000-19,999	0.02	0.02		0.25	0.17		0.27	0.19	
			20,000-24,999		0.00		0.34	0.16		0.34	0.16	
				19.03	0.50		8.97	0.50		28.00	1.00	
27	38.3	Light	0-4,999	13.90	0.02		1.12			15.02	0.02	
		Medium	5,000-9,999	7.36	0.46		3.38			10.74	0.46	
		Heavy	10,000-14,999	0.10	0.28		1.12			1.22	0.28	
			30,000-34,999	0.02	0.04			0.20		0.02	0.24	
				21.38	0.80		5.62	0.20		27.00	1.00	
28	39.3	Light	0-4,999	19.30	0.09		6.64			25.94	0.09	
		Medium	5,000-9,999	10.22	2.02	0.18	10.83	0.49		21.05	2.51	0.18
		Heavy	10,000-14,999	0.15	1.25	0.34	7.35	0.84	0.27	7.50	2.09	0.61
			15,000-19,999	0.04	0.12	0.12	2.65	0.64		2.69	0.76	0.12
			20,000-24,999		0.05	0.03	0.51	0.78	0.66	0.51	0.83	0.69
			25,000-29,999			0.00	0.31	1.23	0.40	0.31	1.23	0.40
			30,000-34,999					0.39			0.39	
			35,000-39,999					0.05			0.05	
			55,000-59,999					0.05			0.05	
				29.71	3.53	0.67	28.29	4.47	1.33	58.00	8.00	2.00
29	63.2	Light	0-4,999	7.08	0.02		4.20		0.06	11.28	0.02	0.06
		Medium	5,000-9,999	3.75	0.45	0.04	5.80	0.29	0.06	9.55	0.74	0.10
		Heavy	10,000-14,999	0.05	0.28	0.09	2.30	0.78	0.18	2.35	1.06	0.27
			15,000-19,999	0.02	0.03	0.03	0.30	0.50	0.23	0.32	0.53	0.26
			20,000-24,999		0.01	0.01	0.30	0.43	0.23	0.30	0.44	0.24
			25,000-29,999			0.01	0.20	0.21	0.06	0.20	0.21	0.07
				10.90	0.79	0.18	13.10	2.21	0.82	24.00	3.00	1.00

Table 41A (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
30	26.4	Light	0-4,999	6.95	0.02		1.53			8.48	0.02	
		Medium	5,000-9,999	3.68	0.50		3.39			7.07	0.50	
		Heavy	10,000-14,999	0.05	0.31		2.20			2.25	0.31	
			15,000-19,999	0.01	0.03		1.19			1.20	0.03	
			20,000-24,999		0.01			0.13			0.14	
				10.69	0.87		8.31	0.13		19.00	1.00	
31	13.8	Light	0-4,999	4.17			2.40			6.57		
		Medium	5,000-9,999	2.20			4.80			7.00		
		Heavy	10,000-14,999	0.03			2.40			2.43		
				6.40			9.60			16.00		
32	50.8	Light	0-4,999	5.72			3.30			9.02		
		Medium	5,000-9,999	3.03			6.60			9.63		
		Heavy	10,000-14,999	0.05			3.30			3.35		
				8.80			13.20			22.00		
33	64.9	Light	0-4,999	6.18			2.00			8.18		
		Medium	5,000-9,999	3.27			3.50	0.67		6.77	0.67	
		Heavy	10,000-14,999	0.05				0.33		0.05	0.33	
				9.50			5.50	1.00		15.00	1.00	
34	27.3	Light	0-4,999	0.37			1.15			1.52		
		Medium	5,000-9,999	0.20			0.14			0.34		
		Heavy	10,000-14,999	0.00			0.14			0.14		
				0.57			1.43			2.00		
35	57.2	Light	0-4,999	2.76			1.30			4.06		
		Medium	5,000-9,999	1.46		0.14	2.86			4.32		0.14
		Heavy	10,000-14,999	0.02		0.29	1.19			1.21		0.29
			15,000-19,999	0.00		0.10	0.11		0.22	0.11		0.32
			20,000-24,999			0.03	0.19			0.19		0.03
			25,000-29,999			0.00	0.11		0.22	0.11		0.22
				4.24		0.56	5.76		0.44	10.00		1.00
36	51.9	Light	0-4,999	3.72	0.01		11.42	0.15		15.14	0.16	
		Medium	5,000-9,999	1.97	0.13		1.43	0.31		3.40	0.44	
		Heavy	10,000-14,999	0.03	0.09		1.43	0.31		1.46	0.40	
				5.72	0.23		14.28	0.77		20.00	1.00	
37	116.1	Light	0-4,999	2.50			1.21			3.71		
		Medium	5,000-9,999	1.32			2.24			3.56		
		Heavy	10,000-14,999	0.02			2.45			2.47		
			15,000-19,999	0.01			1.10			1.11		
			20,000-24,999				0.11			0.11		
			25,000-29,999				0.04			0.04		
				3.85			7.15			11.00		
38	8.6	Light	0-4,999	11.79	0.04		5.90			17.69	0.04	
		Medium	5,000-9,999	6.24	0.92		6.40	0.70		12.64	1.62	
		Heavy	10,000-14,999	0.09	0.57		1.77	0.60		1.86	1.17	
			15,000-19,999	0.01	0.06		0.70	0.10		0.71	0.16	
			20,000-24,999		0.01		0.10			0.10	0.01	
				18.13	1.60		14.87	1.40		33.00	3.00	
39	14.3	Light	0-4,999	5.20	0.01		1.50			6.70	0.01	
		Medium	5,000-9,999	2.74	0.32		2.07	0.18		4.81	0.50	
		Heavy	10,000-14,999	0.04	0.20		1.19			1.23	0.20	
			15,000-19,999	0.00	0.02		0.21	0.27		0.21	0.29	
			20,000-24,999		0.00		0.05			0.05		
				7.98	0.55		5.02	0.45		13.00	1.00	

Table 41A (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
40	1.4	Light	0-4,999	26.73	0.05		12.33			39.06	0.05	
		Medium	5,000-9,999	14.14	1.00	0.33	18.50	0.16		32.64	1.16	0.33
		Heavy	10,000-14,999	0.21	0.63	0.68	11.99	0.80		12.20	1.43	0.68
			15,000-19,999	0.04	0.06	0.24	2.06	0.64		2.10	0.70	0.24
			20,000-14,999		0.02	0.06		0.64	0.33		0.66	0.39
			25,000-29,999			0.02			0.34			0.36
				41.12	1.76	1.33	44.88	2.24	0.67	86.00	4.00	2.00
41	2.0	Light	0-4,999	29.88	0.08		9.68			39.56	0.08	
		Medium	5,000-9,999	15.81	1.76	0.10	18.24	0.34	0.10	34.05	2.10	0.20
		Heavy	10,000-14,999	0.23	1.09	0.20	16.01	1.02		16.24	2.11	0.20
			15,000-19,999	0.06	0.10	0.07	3.90	1.24		3.96	1.34	0.07
			20,000-24,999		0.03	0.02		0.23			0.26	0.02
			25,000-29,999			0.01		0.11	0.40		0.11	0.41
			30,000-34,999						0.10			0.10
			40,000-44,999					0.19			0.19	
				45.98	3.06	0.40	48.02	2.94	0.60	94.00	6.00	1.00
42	74.8	Light	0-4,999	44.28	0.02		10.90			55.18	0.02	
		Medium	5,000-9,999	23.43	0.38		18.93	0.15		42.36	0.53	
		Heavy	10,000-14,999	0.34	0.24		7.41	0.74		7.75	0.98	
			15,000-19,999	0.06	0.02		1.65	0.30		1.71	0.32	
			20,000-24,999		0.01			0.07			0.08	
			25,000-29,999					0.07			0.07	
				68.11	0.67		38.89	1.33		107.00	2.00	
43	45.6	Light	0-4,999	10.82	0.03		3.93			14.75	0.03	
		Medium	5,000-9,999	5.73	0.68	0.08	6.37	0.07		12.10	0.75	0.08
		Heavy	10,000-14,999	0.08	0.42	0.17	4.49			4.57	0.42	0.17
			15,000-19,999	0.02	0.04	0.06	0.56	0.37		0.58	0.41	0.06
			20,000-24,999		0.02	0.02		0.07	0.45		0.09	0.47
			25,000-29,999			0.00		0.07	0.11		0.07	0.11
			30,000-34,999					0.23	0.11		0.23	0.11
				16.65	1.19	0.33	15.35	0.81	0.67	32.00	2.00	1.00
44	14.0	Light	0-4,999	5.20	0.01		1.50			6.70	0.01	
		Medium	5,000-9,999	2.73	0.31		2.07	0.18		4.80	0.49	
		Heavy	10,000-14,999	0.04	0.20		1.19			1.23	0.20	
			15,000-19,999	0.01	0.02		0.21	0.27		0.22	0.29	
			20,000-24,999		0.01		0.05			0.05	0.01	
				7.98	0.55		5.02	0.45		13.00	1.00	
All	5419.0	Light	0-4,999	15.8845	0.0504		5.4047	0.0039	0.0007	21.2892	0.0543	0.0007
Routes		Medium	5,000-9,999	8.3950	1.1315	0.1200	8.2602	0.3845	0.0124	16.6552	1.5160	0.1324
		Heavy	10,000-14,999	0.1075	0.6317	0.2383	5.3453	0.9343	0.1159	5.4528	1.5660	0.3542
			15,000-19,999	0.0219	0.0665	0.0875	1.3571	0.6935	0.1174	1.3790	0.7600	0.2049
			20,000-24,999		0.0187	0.0184	0.1916	0.3952	0.2445	0.1916	0.4139	0.2629
			25,000-29,999		0.0088	0.0066	0.0555	0.2715	0.1999	0.0555	0.2803	0.2065
			30,000-34,999				0.0016	0.1157	0.0917	0.0016	0.1157	0.0917
			35,000-39,999				0.0031	0.0161	0.0043	0.0031	0.0161	0.0043
			40,000-44,999				0.0017		0.0115	0.0017		0.0115
			45,000-49,999									
			50,000-54,999									
			55,000-59,999					0.0036			0.0036	
				24.4089	1.9076	0.4708	20.6208	2.8183	0.7983	45.0297	4.7259	1.2691

TABLE 41B

INCIDENCE OF TRACTOR-TRUCK SEMI-TRAILER COMBINATIONS ALONG

FEDERAL AID SYSTEM CLASSIFIED BY GROSS LOADS IMPOSED,

LOADED AND EMPTY

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n.	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	677.6	Light	0-4,999	0.01	0.02			0.03		0.01	0.05	
		Medium	5,000-9,999	0.04	0.14	0.07	0.07			0.11	0.14	0.07
		Heavy	10,000-14,999	0.01	0.12	0.09	0.10	0.03	0.13	0.11	0.15	0.22
			15,000-19,999	0.01	0.12	0.09	0.07	0.07	0.17	0.08	0.19	0.26
			20,000-24,999		0.01	0.05	0.03	0.14	0.04	0.03	0.15	0.45
			25,000-29,999			0.01		0.07	0.30		0.07	0.31
			30,000-34,999					0.10	0.20		0.10	0.20
			35,000-39,999					0.07	0.07		0.07	0.07
			40,000-44,999					0.03	0.13		0.03	0.13
				0.07	0.41	0.31	0.27	0.54	1.40	0.34	0.95	1.71
2	689.4	Light	0-4,999	0.13	0.06		0.02			0.15	0.06	
		Medium	5,000-9,999	0.35	0.50	0.33	0.05		0.02	0.40	0.50	0.35
		Heavy	10,000-14,999	0.12	0.42	0.46	0.09	0.14	0.16	0.21	0.56	0.62
			15,000-19,999	0.03	0.42	0.45	0.16	0.13	0.55	0.19	0.55	1.00
			20,000-24,999		0.03	0.27	0.12	0.29	0.88	0.12	0.32	1.15
			25,000-29,999			0.07	0.18	0.50	0.97	0.18	0.50	1.04
			30,000-34,999				0.11	0.32	0.79	0.11	0.32	0.79
			35,000-39,999				0.02	0.16	0.41	0.02	0.16	0.41
			40,000-44,999					0.07	0.11		0.07	0.11
			45,000-49,999					0.02	0.02		0.02	0.02
			70,000-74,999						0.05			0.05
			75,000-79,999						0.02			0.02
				0.63	1.43	1.58	0.75	1.63	3.98	1.38	3.06	5.56
3	436.5	Light	0-4,999	0.07	0.01					0.07	0.01	
		Medium	5,000-9,999	0.18	0.09	0.19	0.13	0.05		0.31	0.14	0.19
		Heavy	10,000-14,999	0.06	0.07	0.27	0.10	0.13	0.08	0.16	0.20	0.35
			15,000-19,999	0.02	0.07	0.17	0.10	0.10	0.20	0.12	0.17	0.46
			20,000-24,999		0.01	0.13	0.08	0.10	0.33	0.08	0.11	0.48
			25,000-29,99			0.04		0.18	0.18		0.18	0.22
			30,000-34,999					0.07	0.33		0.07	0.33
			35,000-39,999						0.25			0.25
			40,000-44,999					0.05	0.05		0.05	0.05
				0.33	0.25	0.91	0.41	0.68	1.42	0.74	0.93	2.33
4	53.0	Light	0-4,999	1.14	0.41	0.02				1.14	0.41	0.02
		Medium	5,000-9,999	3.22	3.32	1.65				3.22	3.32	1.65
		Heavy	10,000-14,999	1.07	2.67	2.43	2.59	1.55		3.66	4.22	2.43
			15,000-19,999	0.27	2.74	2.38	1.55	1.04	1.55	1.82	3.78	3.93
			20,000-24,999		0.19	1.42	4.15	1.04	3.12	4.15	1.23	4.54
			25,000-29,999			0.35	2.07	4.14	2.07	2.07	4.14	2.42
			30,000-34,999			0.02	1.04	2.07	2.59	1.04	2.07	2.61
			35,000-39,999				0.52	0.52	0.52	0.52	0.52	0.52
			40,000-44,999			0.02			1.55			1.57
				5.70	9.33	8.29	11.92	10.36	11.40	17.62	19.89	19.69
5	184.1	Light	0-4,999	0.02						0.02		
		Medium	5,000-9,999	0.05	0.03	0.09	0.08	0.08		0.13	0.11	0.09
		Heavy	10,000-14,999	0.01	0.02	0.13	0.07		0.38	0.08	0.02	0.51
			15,000-19,999		0.02	0.13	0.08		0.37	0.08	0.02	0.50
			20,000-24,999			0.08	0.07		0.45	0.07		0.53
			25,000-29,999			0.02			0.60			0.62
			30,000-34,999					0.07			0.07	
			50,000-54,999						0.08			0.08
			55,000-59,999						0.07			0.07
				0.08	0.07	0.45	0.30	0.15	1.95	0.38	0.22	2.40

TABLE 41B (Continued)

F. A. Route No.	Length Miles	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
		Class'n	Class Intervals	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.
6	115.8	Light	0-4,999									
		Medium	5,000-9,999			0.16						0.16
		Heavy	10,000-14,999			0.23			0.15			0.38
			15,000-19,999			0.22						0.22
			20,000-24,999			0.13						0.13
			25,000-29,999			0.03			0.15			0.18
			30,000-34,999						0.62			0.62
			35,000-39,999						0.31			0.31
						0.77			1.23			2.00
7	91.1	Light	0-4,999	0.10			0.07			0.17		
		Medium	5,000-9,999	0.29	0.03	0.16	0.07			0.36	0.03	0.16
		Heavy	10,000-14,999	0.10	0.02	0.24	0.07			0.17	0.02	0.24
			15,000-19,999	0.02	0.02	0.23			0.44	0.02	0.02	0.67
			20,000-24,999			0.14	0.44		0.73	0.44		0.87
			25,000-29,999			0.03			0.51			0.54
			30,000-34,999						0.22			0.22
			40,000-44,999						0.07			0.07
				0.51	0.07	0.80	0.65		1.97	1.16	0.07	2.77
8	104.0	Light	0-4,999	0.06	0.01					0.06	0.01	
		Medium	5,000-9,999	0.16	0.10	0.06				0.16	0.10	0.06
		Heavy	10,000-14,999	0.06	0.08	0.08				0.06	0.08	0.08
			15,000-19,999	0.01	0.09	0.08		0.14	0.14	0.01	0.23	0.22
			20,000-24,999		0.01	0.05			0.57		0.01	0.62
			25,000-29,999			0.01		0.14	0.29		0.14	0.30
			30,000-34,999					0.43	0.14		0.43	0.14
			35,000-39,999						0.29			0.29
				0.29	0.29	0.28		0.71	1.43	0.29	1.00	1.71
9	66.8	Light	0-4,999	0.03	0.01					0.03	0.01	
		Medium	5,000-9,999	0.08	0.03	0.04	0.15			0.23	0.03	0.04
		Heavy	10,000-14,999	0.03	0.02	0.07	0.08			0.11	0.02	0.07
			15,000-19,999	0.01	0.02	0.07				0.01	0.02	0.07
			20,000-24,999			0.04		0.08			0.08	0.04
			25,000-29,999			0.01						0.01
			30,000-34,999						0.15			0.15
			35,000-39,999						0.08			0.08
				0.15	0.08	0.23	0.23	0.08	0.23	0.38	0.16	0.46
10	111.0	Light	0-4,999	0.02	0.01					0.02	0.01	
		Medium	5,000-9,999	0.05	0.08	0.24				0.05	0.06	0.24
		Heavy	10,000-14,999	0.02	0.05	0.34			0.27	0.02	0.05	0.61
			15,000-19,999		0.05	0.33			0.18		0.05	0.51
			20,000-24,999		0.01	0.20		0.09	0.62		0.10	0.82
			25,000-29,999			0.05		0.18	0.89		0.18	0.94
			30,000-34,999					0.18	0.89		0.18	0.89
			35,000-39,999						0.18			0.16
			40,000-44,999						0.09			0.09
				0.09	0.18	1.16		0.45	3.12	0.09	0.63	4.28
11	220.7	Light	0-4,999	0.05	0.01					0.05	0.01	
		Medium	5,000-9,999	0.13	0.08	0.02	0.08			0.21	0.08	0.02
		Heavy	10,000-14,999	0.04	0.07	0.02	0.15	0.08		0.19	0.15	0.02
			15,000-19,999	0.01	0.07	0.02				0.01	0.07	0.02
			20,000-24,999			0.01		0.07			0.07	0.01
			25,000-29,999			0.01						0.01
			30,000-34,999						0.08			0.08
				0.23	0.23	0.08	0.23	0.15	0.08	0.46	0.38	0.16

TABLE 41B (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
12	9.8	Light	0-4,999	0.09	0.03					0.09	0.03	
		Medium	5,000-9,999	0.24	0.23	0.09	0.64			0.88	0.23	0.09
		Heavy	10,000-14,999	0.08	0.18	0.13	0.21			0.29	0.18	0.13
			15,000-19,999	0.02	0.19	0.12	0.22	0.21	0.22	0.24	0.40	0.34
			20,000-24,999		0.01	0.07					0.01	0.07
			25,000-29,999			0.02						0.02
				0.43	0.64	0.43	1.07	0.21	0.22	1.50	0.85	0.65
15	362.5	Light	0-4,999	0.06	0.03					0.06	0.03	
		Medium	5,000-9,999	0.17	0.21	0.06		0.15		0.17	0.36	0.06
		Heavy	10,000-14,999	0.06	0.17	0.09		0.15		0.06	0.32	0.09
			15,000-19,999	0.01	0.18	0.09				0.01	0.18	0.09
			20,000-24,999		0.01	0.05			0.60		0.01	0.65
			25,000-29,999			0.01		0.15	0.15		0.15	0.16
			30,000-34,999						0.30			0.30
			35,000-39,999									
			40,000-44,999					0.15			0.15	
			45,000-49,999						0.15			0.15
				0.30	0.60	0.30		0.60	1.20	0.30	1.20	1.50
16	329.9	Light	0-4,999	0.03	0.02		0.04			0.07	0.02	
		Medium	5,000-9,999	0.07	0.18	0.16	0.05			0.12	0.18	0.16
		Heavy	10,000-14,999	0.02	0.15	0.24	0.04	0.21	0.04	0.06	0.36	0.28
			15,000-19,999	0.01	0.15	0.23		0.42	0.21	0.01	0.57	0.44
			20,000-24,999		0.01	0.14	0.05	0.30	0.51	0.05	0.31	0.65
			25,000-29,999			0.04		0.13	0.30		0.13	0.34
			30,000-24,999				0.04	0.09	0.82	0.04	0.09	0.82
			35,000-39,999					0.13	0.13		0.13	0.13
			40,000-44,999						0.04			0.04
				0.13	0.51	0.81	0.22	1.28	2.05	0.35	1.79	2.86
17	75.2	Light	0-4,999	0.09	0.04					0.09	0.04	
		Medium	5,000-9,999	0.25	0.31	0.18				0.25	0.31	0.18
		Heavy	10,000-14,999	0.08	0.26	0.26		0.22		0.08	0.48	0.26
			15,000-19,999	0.02	0.26	0.26				0.02	0.26	0.26
			20,000-24,999		0.02	0.15		0.22	0.22		0.24	0.37
			25,000-29,999			0.04			0.22			0.26
			35,000-39,999				0.22	0.22	0.23	0.22	0.22	0.23
			40,000-44,999					0.23			0.23	
				0.44	0.89	0.89	0.22	0.89	0.67	0.66	1.78	1.56
18	82.8	Light	0-4,999	0.13	0.01					0.13	0.01	
		Medium	5,000-9,999	0.38	0.12					0.38	0.12	
		Heavy	10,000-14,999	0.13	0.09					0.13	0.09	
			15,000-19,999	0.03	0.10					0.03	0.10	
			20,000-24,999		0.01						0.01	
			25,000-29,999					0.33			0.33	
			30,000-34,999					0.33			0.33	
			35,000-39,999					0.34			0.34	
				0.67	0.33			1.00		0.67	1.33	
19	63.2	Light	0-4,999		0.03						0.03	
		Medium	5,000-9,999		0.08	0.01	0.05			0.05	0.08	0.01
		Heavy	10,000-14,999		0.03	0.07		0.05	0.05		0.08	0.12
			15,000-19,999		0.01	0.06		0.05	0.25		0.06	0.31
			20,000-24,999			0.06		0.05	0.20		0.05	0.26
			25,000-29,999					0.10	0.45		0.10	0.45
			30,000-34,999						0.20			0.20
			35,000-39,999						0.10			0.10
			40,000-44,999						0.10			0.10
					0.15	0.[illegible]	0.0[illegible]	0.2[illegible]	1.[illegible]	0.05	0.40	1.55

TABLE 41B (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
20	61.9	Light	0-4,999		0.03						0.03	
		Medium	5,000-9,999		0.24						0.24	
		Heavy	10,000-14,999		0.19			0.33			0.52	
			15,000-19,999		0.20						0.20	
			20,000-24,999		0.01				0.67		0.01	0.87
			26,000-29,999						0.33			0.33
					0.67			0.33	1.00		1.00	1.00
21	108.3	Light	0-4,999	0.43	0.15	0.01				0.43	0.15	0.01
		Medium	5,000-9,999	1.23	1.22	0.39		0.22		1.23	1.44	0.39
		Heavy	10,000-14,999	0.41	0.99	0.57	0.22	0.85		0.63	1.64	0.57
			15,000-19,999	0.10	1.00	0.56	0.22	0.43	0.22	0.32	1.45	0.78
			20,000-24,999		0.08	0.34	0.43		0.43	0.43	0.08	0.77
			25,000-29,999			0.08		0.43	0.43		0.43	0.51
			30,000-34,999					0.22	0.22		0.22	0.22
			35,000-39,999					0.65	0.22		0.65	0.22
			40,000-44,999					0.21	0.22		0.21	0.22
				2.17	3.46	1.95	0.87	2.81	1.74	3.04	6.27	3.69
23	140.6	Light	0-4,999	0.34	0.04					0.34	0.04	
		Medium	5,000-9,999	0.94	0.29					0.94	0.29	
		Heavy	10,000-14,999	0.31	0.24					0.31	0.24	
			15,000-19,999	0.08	0.24					0.08	0.24	
			20,000-24,999		0.02						0.02	
			25,000-29,999					0.83			0.83	
			30,000-34,999					0.83			0.83	
			35,000-39,999					0.84			0.84	
				1.67	0.83			2.50		1.67	3.33	
24	165.1	Light	0-4,999	0.03						0.03		
		Medium	5,000-9,999	0.08	0.03	0.05	0.15			0.23	0.03	0.05
		Heavy	10,000-14,999	0.03	0.02	0.07	0.08			0.11	0.02	0.07
			15,000-19,999	0.01	0.03	0.06				0.01	0.03	0.06
			20,000-24,999			0.04		0.08			0.08	0.04
			25,000-29,999			0.01						0.01
			30,000-34,999						0.15			0.15
			35,000-39,999						0.08			0.08
				0.15	0.08	0.23	0.23	0.08	0.23	0.38	0.16	0.46
28	39.3	Light	0-4,999	0.04	0.01					0.04	0.01	
		Medium	5,000-9,999	0.11	0.12	0.06				0.11	0.12	0.06
		Heavy	10,000-14,999	0.04	0.09	0.09	0.09	0.05		0.13	0.14	0.09
			15,000-19,999	0.01	0.10	0.08	0.05	0.04	0.05	0.06	0.14	0.13
			20,000-24,999		0.01	0.05	0.15	0.04	0.12	0.15	0.05	0.17
			25,000-29,999			0.01	0.07	0.14	0.07	0.07	0.14	0.08
			30,000-34,999				0.04	0.07	0.09	0.04	0.07	0.09
			35,000-39,999				0.02	0.02	0.02	0.02	0.02	0.02
			40,000-44,999						0.05			0.05
				0.20	0.33	0.29	0.42	0.36	0.40	0.62	0.69	0.69
29	63.2	Light	0-4,999									
		Medium	5,000-9,999			0.07						0.07
		Heavy	10,000-14,999			0.11						0.11
			15,000-19,999			0.10		0.07	0.07		0.07	0.17
			20,000-24,999			0.06			0.07			0.13
			25,000-29,999			0.02			0.22			0.24
			30,000-34,999				0.07		0.14	0.07		0.14
						0.36	0.07	0.07	0.50	0.07	0.07	0.66

TABLE 41B (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
35	57.2	Light	0-4,999	0.02			0.02			0.04		
		Medium	5,000-9,999	0.06	0.01	0.04	0.02			0.08	0.01	0.04
		Heavy	10,000-14,999	0.02		0.06	0.02			0.04		0.08
			15,000-19,999		0.01	0.06			0.10		0.01	0.18
			20,000-24,999			0.04	0.13		0.20	0.13		0.24
			25,000-29,999			0.01			0.10			0.11
			30,000-34,999						0.06			0.06
			35,000-39,999									
			40,000-44,999						0.02			0.02
				0.10	0.02	0.21	0.19		0.48	0.29	0.02	0.89
38	8.6	Light	0-4,999									
		Medium	5,000-9,999			0.09		0.14			0.14	0.09
		Heavy	10,000-14,999			0.13			0.14			0.27
			15,000-19,999			0.12						0.12
			20,000-24,999			0.07			0.14			0.21
			25,000-29,999			0.02			0.15			0.17
						0.43		0.14	0.43		0.14	0.88
40	1.4	Light	0-4,999	0.08	0.03	0.01				0.08	0.03	0.01
		Medium	5,000-9,999	0.22	0.26	0.71				0.22	0.28	0.71
		Heavy	10,000-14,999	0.07	0.23	1.03			0.79	0.07	0.23	1.82
			15,000-19,999	0.02	0.23	1.01				0.02	0.23	1.01
			20,000-24,999		0.02	0.60		0.39	2.36		0.41	2.98
			25,000-29,999			0.15			1.57			1.72
			30,000-34,999			0.01			0.79			0.80
			35,000-39,999						0.39			0.39
			40,000-44,999			0.01						0.01
				0.39	0.79	3.53		0.39	5.90	0.39	1.18	9.43
41	2.0	Light	0-4,999	0.09	0.05					0.09	0.05	
		Medium	5,000-9,999	0.24	0.45	0.09				0.24	0.45	0.09
		Heavy	10,000-14,999	0.08	0.37	0.13		0.43		0.08	0.80	0.13
			15,000-19,999	0.02	0.38	0.12				0.02	0.38	0.12
			20,000-24,999		0.03	0.07					0.03	0.07
			25,000-29,999			0.02						0.02
			30,000-34,999						0.43			0.43
				0.43	1.28	0.43		0.43	0.43	0.43	1.71	0.86
43	45.6	Light	0-4,999									
		Medium	5,000-9,999									
		Heavy	10,000-14,999									
			15,000-19,999									
			20,000-24,999									
			25,000-29,999									
			30,000-34,999									
			35,000-39,999									
			40,000-44,999									
			45,000-49,999						1.00			1.00
									1.00			1.00
44	14.0	Light	0-4,999	0.03				0.17		0.03	0.17	
		Medium	5,000-9,999	0.10			0.17			0.27		
			10,000-14,999	0.03			0.17			0.20		
			15,000-19,999	0.01			0.18	0.16		0.17	0.16	
				0.17			0.50	0.33		0.67	0.23	

TABLE 418 (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
All	5419.0	Light	0-4,999	.0680	.0230		.0070	.0040		.0750	.0270	
Routes		Medium	5,000-9,999	.1890	.2000	.1250	.0430	.0210	.0020	.2320	.2210	.1270
		Heavy	10,000-14,999	.0690	.1620	.1750	.0810	.0950	.0700	.1500	.2570	.2450
			15,000-19,999	.0180	.1550	.3880	.0600	.0840	.0540	.0780	.2490	.4520
			20,000-24,999		.0150	.1030	.0880	.1190	.3520	.0880	.1340	.4850
			25,000-29,999			.0270	.1440	.1900	.3010	.1440	.1900	.3280
			30,000-34,999				.0280	.1290	.3010	.0280	.1290	.3010
			35,000-39,999				.0100	.0850	.1230	.0100	.0850	.1230
			40,000-44,999					.0300	.0690		.0300	.0690
			45,000-49,999					.0020	.0220		.0020	.0220
			50,000-54,999						.0030			.0030
			55,000-59,999						.0020			.0020
			60,000-64,999									
			65,000-69,999									
			70,000-74,999						.0050			.0050
			75,000-79,999						.0020			.0020
				.3440	.5650	.8180	.4610	.7590	1.3170	.8050	1.3240	2.1350

Table 41C

INCIDENCE OF TRUCKS OF TRUCK AND TRAILER COMBINATIONS

ALONG FEDERAL AID SYSTEM CLASSIFIED BY GROSS LOADS IMPOSED,

LOADED AND EMPTY

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	677.6	Light	0-4,999	0.05						0.05		
		Medium	5,000-9,999	0.21	0.03	0.01	0.14			0.35	0.03	0.01
		Heavy	10,000-14,999	0.02	0.11	0.02	0.05	0.10		0.07	0.21	0.02
			15,000-19,999		0.01	0.02					0.01	0.02
			20,000-24,999			0.04		0.05	0.09		0.05	0.13
			25,000-29,999						0.05			0.05
				0.28	0.15	0.09	0.19	0.15	0.14	0.47	0.30	0.23
2	689.4	Light	0-4,999	0.12			0.08			0.20		
		Medium	5,000-9,999	0.50	0.23	0.03	0.24	0.02		0.74	0.25	0.03
		Heavy	10,000-14,999	0.06	0.73	0.04	0.30	0.10		0.36	0.83	0.04
			15,000-19,999		0.06	0.04	0.14	0.16	0.02	0.14	0.22	0.06
			20,000-24,999		0.01	0.08	0.12	0.46	0.36	0.12	0.47	0.44
			25,000-29,999			0.01	0.06	0.36	0.77	0.06	0.36	0.78
			30,000-34,999					0.12	0.48		0.12	0.48
			35,000-39,999					0.04	0.18		0.04	0.18
			40,000-44,999						0.06			0.06
			45,000-49,999						0.02			0.02
				0.68	1.03	0.20	0.94	1.26	1.89	1.62	2.29	2.09
3	436.5	Light	0-4,999	0.01			0.04			0.05		
		Medium	5,000-9,999	0.05	0.06	0.03	0.14			0.19	0.06	0.03
		Heavy	10,000-14,999	0.01	0.18	0.05	0.20	0.09		0.21	0.27	0.05
			15,000-19,999		0.01	0.05	0.07	0.14	0.05	0.07	0.15	0.10
			20,000-24,999			0.11		0.09	0.32		0.09	0.43
			25,000-29,999			0.01		0.02	0.45		0.02	0.46
			30,000-34,999					0.16	0.45		0.16	0.45
			35,000-39,999					0.05	0.11		0.05	0.11
			40,000-44,999						0.05			0.05
				0.07	0.25	0.25	0.45	0.55	1.43	0.52	0.80	1.68
4	53.0	Light	0-4,999	0.56						0.56		
		Medium	5,000-9,999	2.29	3.08	0.24	0.26			2.55	3.08	0.24
		Heavy	10,000-14,999	0.26	9.55	0.38	4.15	0.52		4.41	10.07	0.38
			15,000-19,999		0.74	0.33	0.52	2.85	0.26	0.52	3.59	0.59
			20,000-24,999		0.12	0.77	0.26	5.97		0.26	6.09	0.77
			25,000-29,999			0.10	0.26	4.93	0.26	0.26	4.93	0.36
			30,000-34,999					2.34			2.34	
				3.11	13.49	1.82	5.45	16.61	0.52	8.56	30.10	2.34
5	184.1	Light	0-4,999	0.02			0.09			0.11		
		Medium	5,000-9,999	0.07	0.01	0.02	0.04			0.11	0.01	0.02
		Heavy	10,000-14,999		0.03	0.04	0.04		0.04	0.04	0.03	0.08
			15,000-19,999			0.03	0.05		0.09	0.05		0.12
			20,000-24,999			0.07			0.09			0.16
			25,000-29,999			0.01			0.26			0.27
				0.09	0.04	0.17	0.22		0.48	0.31	0.04	0.65
6	115.8	Light	0-4,999									
		Medium	5,000-9,999				1.00			1.00		
		Heavy	10,000-14,999									
							1.00			1.00		

Table 41C (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
7	91.1	Light	0-4,999	0.09			0.50			0.59		
		Medium	5,000-9,999	0.37	0.11		0.50			0.87	0.11	
		Heavy	10,000-14,999	0.04	0.35					0.04	0.35	
			15,000-19,999		0.04			0.50			0.54	
			20,000-24,999									
			25,000-29,999									
			30,000-34,999									
			35,000-39,999					0.50			0.50	
				0.50	0.50		1.00	1.00		1.50	1.50	
8	104.0	Light	0-4,999									
		Medium	5,000-9,999			0.02						0.02
		Heavy	10,000-14,999			0.04	0.26	0.09		0.26	0.09	0.04
			15,000-19,999			0.03						0.03
			20,000-24,999			0.07			0.09			0.16
			25,000-29,999			0.01			0.96			0.97
			30,000-34,999						0.17			0.17
			35,000-39,999						0.26			0.26
						0.17	0.26	0.09	1.48	0.26	0.09	1.65
10	111.0	Light	0-4,999	0.04			0.21			0.25		
		Medium	5,000-9,999	0.16		0.02	0.29			0.45		0.02
		Heavy	10,000-14,999	0.02		0.03	0.14			0.16		0.03
			15,000-19,999			0.03						0.03
			20,000-24,999			0.06						0.06
			25,000-29,999									
				0.22		0.14	0.64			0.86		0.14
11	220.7	Light	0-4,999	0.05			0.25			0.30		
		Medium	5,000-9,999	0.18			0.37	0.13		0.55	0.13	
		Heavy	10,000-14,999	0.02						0.02		
			15,000-19,999									
			20,000-24,999									
			25,000-29,999									
				0.25			0.62	0.13		0.87	0.13	
12	9.8	Light	0-4,999	0.18						0.18		
		Medium	5,000-9,999	0.74		0.13				0.74		0.13
		Heavy	10,000-14,999	0.08		0.21				0.08		0.21
			15,000-19,999			0.18						0.18
			20,000-24,999			0.42						0.42
			25,000-29,999			0.06	1.00			1.00		0.06
				1.00		1.00	1.00			2.00		1.00
15	362.5	Light	0-4,999	0.03			0.14			0.17		
		Medium	5,000-9,999	0.11	0.03					0.11	0.03	
		Heavy	10,000-14,999	0.01	0.10					0.01	0.10	
			15,000-19,999		0.01						0.01	
			20,000-24,999					0.14			0.14	
			25,000-29,999					0.29	0.14		0.29	0.14
				0.15	0.14		0.14	0.43	0.14	0.29	0.57	0.14
16	329.9	Light	0-4,999	0.03			0.06			0.09		
		Medium	5,000-9,999	0.13	0.04		0.13			0.26	0.04	
		Heavy	10,000-14,999	0.02	0.13		0.06	0.03		0.08	0.16	
			15,000-19,999		0.01		0.06	0.03		0.06	0.04	
			20,000-24,999					0.06	0.03		0.06	0.03
			25,000-29,999				0.03	0.06		0.03	0.06	
			30,000-34,999									
			35,000-39,999						0.09			0.09
				0.18	0.18		0.34	0.18	0.12	0.52	0.36	0.12

Table 41C (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Rated Capacity			Loaded Weight Data Rated Capacity			Gross Totals Ratad Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
17	75.2	Light	0-4,999									
		Medium	5,000-9,999		0.14		0.20			0.20	0.14	
		Heavy	10,000-14,999		0.42		0.20			0.20	0.42	
			15,000-19,999		0.03						0.03	
			20,000-24,999		0.01		0.40	0.20	0.40	0.40	0.21	0.40
			25,000-19,999									
					0.60		0.80	0.20	0.40	0.80	0.80	0.40
18	82.8	Light	0-4,999									
		Medium	5,000-9,999		0.11						0.11	
		Haavy	10,000-14,999		0.35		0.50			0.50	0.35	
			15,000-19,999		0.03						0.03	
			20,000-24,999		0.01						0.01	
			25,000-29,999					1.00			1.00	
					0.50		0.50	1.00		0.50	1.50	
19	63.2	Light	0-4,999				0.13			0.13		
		Medium	5,000-9,999		0.03		0.13			0.13	0.03	
		Heavy	10,000-14,999		0.08		0.12	0.12		0.12	0.20	
			15,000-19,999		0.01						0.01	
			20,000-24,999					0.13	0.63		0.13	0.63
			25,000-29,999						0.50			0.50
			30,000-34,999									
			35,000-39,999						0.12			0.12
					0.12		0.38	0.25	1.25	0.38	0.37	1.25
20	61.9	Light	0-4,999	0.18						0.18		
		Medium	5,000-9,999	0.74						0.74		
		Heavy	10,000-14,999	0.08						0.08		
			15,000-19,999									
			20,000-24,999				1.00			1.00		
				1.00			1.00			2.00		
21	108.3	Light	0-4,999	0.08			0.21			0.29		
		Medium	5,000-9,999	0.32	0.10					0.32	0.10	
		Heavy	10,000-14,999	0.03	0.30		0.21			0.24	0.30	
			15,000-19,999		0.02		0.22			0.22	0.02	
			20,000-24,999		0.01				0.22		0.01	0.22
			25,000-29,999						0.21			0.21
			30,000-34,999					0.43	0.43		0.43	0.43
			35,000-39,999						0.21			0.21
				0.43	0.43		0.64	0.43	1.07	1.07	0.86	1.07
23	140.5	Light	0-4,999									
		Medium	5,000-9,999		0.06						0.06	
		Heavy	10,000-14,999		0.18		0.25			0.25	0.18	
			15,000-19,999		0.01						0.01	
			20,000-24,999									
			25,000-29,999					0.50			0.50	
					0.25		0.25	0.50		0.25	0.75	
24	165.1	Light	0-4,999									
		Medium	5,000-9,999									
		Heavy	10,000-14,999									
			35,000-39,999						1.00			1.00
									1.00			1.00
25	51.5	Light	0-4,999									
		Medium	5,000-9,999		0.06						0.06	
		Heavy	10,000-14,999		0.18						0.18	
			15,000-19,999		0.01						0.01	
			20,000-24,999					0.25			0.25	
			25,000-29,999					0.50			0.50	
					0.25			0.75			1.00	

Table 41C (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
28	39.3	Light	0-4,999	0.03						0.03		
		Medium	5,000-9,999	0.11	0.15	0.01	0.01			0.12	0.15	0.01
		Heavy	10,000-14,999	0.01	0.47	0.02	0.20	0.03		0.21	0.50	0.02
			15,000-19,999		0.04	0.02	0.03	0.14	0.02	0.03	0.18	0.04
			20,000-24,999		0.00	0.04	0.01	0.29		0.01	0.29	0.04
			25,000-29,999				0.01	0.24	0.01	0.01	0.24	0.01
			35,000-34,999					0.11			0.11	
				0.15	0.66	0.09	0.26	0.81	0.03	0.41	1.47	0.12
29	63.2	Light	0-4,999	0.01						0.01		
		Medium	5,000-9,999	0.06	0.02					0.06	0.02	
		Heavy	10,000-14,999	0.01	0.06		0.08			0.09	0.06	
			15,000-19,999		0.01						0.01	
			20,000-24,999					0.08	0.17		0.08	0.17
			25,000-29,999						0.33			0.33
			30,000-34,999						0.17			0.17
				0.08	0.09		0.08	0.08	0.67	0.16	0.17	0.67
35	57.2	Light	0-4,999	0.04			0.20			0.24		
		Medium	5,000-9,999	0.15	0.05		0.20			0.35	0.05	
		Heavy	10,000-14,999	0.01	0.14					0.01	0.14	
			15,000-19,999		0.01						0.01	
			20,000-24,999									
			35,000-39,999					0.20			0.20	
				0.20	0.20		0.40	0.20		0.60	0.40	
40	1.4	Light	0-4,999	0.07			0.40			0.47		
		Medium	5,000-9,999	0.29			0.80			1.09		
		Heavy	10,000-14,999	0.04						0.04		
				0.40			1.20			1.60		
44	14.0	Light	0-4,999									
		Medium	5,000-9,999				1.00			1.00		
							1.00			1.00		
All	5419.0	Light	0-4,999	.0398			.0518			.0916		
Routes		Medium	5,000-9,999	.1019	.0799	.0116	.1206	.0052		.2225	.0851	.0116
		Heavy	10,000-14,999	.0186	.2637	.0186	.1386	.0426	.0013	.1572	.3063	.0199
			15,000-19,999		.0208	.0178	.0384	.0677	.0121	.0384	.0885	.0299
			20,000-24,999		.0029	.0376	.0349	.1526	.1085	.0349	.1555	.1461
			25,000-29,999			.0039	.0140	.1529	.1943	.0140	.1529	.1982
			30,000-34,999					.0605	.1112		.0605	.1112
			35,000-39,999					.0166	.0769		.0166	.0769
			40,000-44,999						.0116			.0116
			45,000-49,999						.0025			.0025
				.1603	.3673	.0895	.3983	.4981	.5184	.5586	.8654	.6079

TABLE 41D

INCIDENCE OF TRAILERS OF TRUCK AND TRAILER COMBINATIONS

ALONG FEDERAL AID SYSTEM CLASSIFIED BY GROSS LOADS IMPOSED,

LOADED AND EMPTY

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	677.6	Light	0-4,999	0.20	0.06		0.08			0.28	0.06	
		Medium	5,000-9,999	0.03	0.08	0.05	0.07			0.10	0.08	0.05
		Heavy	10,000-14,999		0.01	0.01			0.08		0.01	0.09
			15,000-19,999			0.02		0.08	0.15		0.08	0.17
			20,000-24,999						0.08			0.08
				0.23	0.15	0.08	0.15	0.08	0.31	0.38	0.23	0.39
2	689.4	Light	0-4,999	0.35	0.31	0.03	0.34	0.02		0.69	0.33	0.03
		Medium	5,000-9,999	0.06	0.37	0.50	0.17	0.24	0.14	0.23	0.81	0.64
		Heavy	10,000-14,999		0.05	0.07	0.05	0.17	0.72	0.05	0.22	0.80
			15,000-19,999			0.15		0.27	0.92		0.27	1.07
			20,000-14,999					0.29	0.55		0.29	0.55
			25,000-29,999					0.10	0.05		0.10	0.05
			30,000-34,999						0.02			0.02
			35,000-39,999						0.05			0.05
				0.41	0.73	0.75	0.58	1.09	2.46	0.97	1.82	3.21
3	436.5	Light	0-4,999	0.10	0.08	0.02	0.20			0.30	0.08	0.02
		Medium	5,000-9,999	0.02	0.10	0.31	0.19	0.05	0.15	0.21	0.15	0.46
		Heavy	10,000-14,999		0.02	0.04		0.07	0.41		0.09	0.46
			15,000-19,999			0.09		0.15	0.39		0.15	0.48
			20,000-24,999					0.10	0.34		0.10	0.34
			25,000-29,999						0.10			0.10
			30,000-34,999						0.02			0.02
			35,000-39,999						0.05			0.05
				0.12	0.20	0.46	0.39	0.37	1.46	0.51	0.57	1.92
4	53.0	Light	0-4,999	2.10	3.43	0.35				2.10	3.43	0.36
		Medium	5,000-9,999	0.33	4.09	5.42	1.62	1.22		1.95	5.31	5.42
		Heavy	10,000-14,999		0.80	0.72			0.41		0.60	1.13
			15,000-19,999			1.63		2.03	4.87		2.03	6.60
			20,000-24,999				0.41	4.87	5.68	0.41	4.87	5.68
			25,000-29,999					0.81	0.41		0.81	0.41
				2.43	8.12	8.12	2.03	8.93	11.37	4.46	17.06	19.49
5	184.1	Light	0-4,999		0.09	0.02		0.07			0.18	0.02
		Medium	5,000-9,999		0.10	0.26	0.07			0.07	0.10	0.26
		Heavy	10,000-14,999		0.01	0.04			0.13		0.01	0.17
			15,000-19,999			0.08			0.07			0.15
			20,000-24,999						0.06			0.08
					0.20	0.40	0.07	0.07	0.26	0.07	0.27	0.66
6	115.8	Light	0-4,999				1.00			1.00		
							1.00			1.00		
7	91.1	Light	0-4,999	0.65			0.75			1.40		
		Medium	5,000-9,999	0.10			0.76			0.85		
		Heavy	10,000-14,999					0.75			0.75	
				0.75			1.50	0.75		2.25	0.75	
8	104.0	Light	0-4,999			0.01						0.01
		Medium	5,000-9,999			0.07	0.32		0.31	0.32		0.38
		Heavy	10,000-14,999			0.01			0.52			0.63
			15,000-19,999			0.02			0.52			0.54
			20,000-24,999						0.11			0.11
			25,000-29,999						0.11			0.11
						0.11	0.32		1.57	0.32		1.68

Table 41b (Continued)

F. A. Route No.	Length Miles	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Total		
				Rated Capacity			Rated Capacity			Rated Capacity		
		Class'n	Class Intervals	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.	Light No.	Medium No.	Heavy No.
10	111.0	Light	0-4,999	0.17	0.04	0.01	0.40			0.67	0.04	0.01
		Medium	5,000-9,999	0.03	0.05	0.13	0.10			0.13	0.06	0.13
		Heavy	10,000-14,999		0.01	0.02					0.01	0.02
			15,000-19,999			0.04						0.04
				0.20	0.10	0.20	0.50			0.70	0.10	0.20
11	220.7	Light	0-4,999	0.22	0.10		0.25		0.25	0.47	0.10	
		Medium	6,000-9,999	0.03	0.13					0.03	0.13	
		Heavy	10,000-14,999		0.02						0.02	
				0.25	0.25		0.25		0.25	0.50	0.26	
12	9.8	Light	0-4,999	0.86		0.04				0.86		0.04
		Medium	5,000-9,999	0.14		0.67	1.00			1.14		0.67
		Heavy	10,000-14,999			0.09						0.09
			15,000-19,999			0.20						0.20
				1.00		1.00	1.00			2.00		1.00
15	362.6	Light	0-4,999				0.50			0.50		
		Medium	5,000-9,999									
		Heavy	10,000-14,999						0.50			0.50
							0.50		0.50	0.50		0.50
16	329.9	Light	0-4,999	0.19	0.02		0.21			0.40	0.02	
		Medium	5,000-9,999	0.03	0.03	0.03	0.05	0.05		0.08	0.08	0.03
		Heavy	10,000-14,999			0.01			0.05			0.06
			15,000-19,999			0.01		0.05	0.05		0.06	0.06
			20,000-24,999					0.06	0.05		0.06	0.06
			25,000-29,999						0.05			0.05
			30,000-34,999						0.06			0.06
				0.22	0.05	0.05	0.26	0.16	0.26	0.48	0.21	0.31
17	75.2	Light	0-4,999									
		Medium	5,000-9,999					1.00			1.00	
		Heavy	10,000-14,999						1.00			1.00
								1.00	1.00		1.00	1.00
19	63.2	Light	0-4,999		0.06						0.06	
		Medium	5,000-9,999		0.08		0.15	0.15	0.31	0.15	0.23	0.31
		Heavy	10,000-14,999		0.01			0.16	0.62		0.17	0.62
			16,000-19,999						0.31			0.31
			20,000-24,999						0.15			0.15
					0.16		0.15	0.31	1.39	0.15	0.48	1.39
20	61.9	Light	0-4,999				1.00			1.00		
		Medium	5,000-9,999					1.00			1.00	
							1.00	1.00		1.00	1.00	
21	108.3	Light	0-4,999	0.62	0.13	0.03	0.60			1.12	0.13	0.03
		Medium	5,000-9,999	0.08	0.15	0.40				0.08	0.16	0.40
		Heavy	10,000-14,999		0.02	0.06					0.02	0.06
			16,000-19,999			0.12			0.60			0.72
			20,000-24,999									
			26,000-29,999						0.30			0.30
				0.60	0.30	0.60	0.60		0.90	1.20	0.30	1.60
24	165.1	Light	0-4,999									
		Medium	5,000-9,999									
		Heavy	10,000-14,999					1.00			1.00	
								1.00			1.00	

Table 41D (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data			Loaded Weight Data			Gross Totals		
				Rated Capacity			Rated Capacity			Rated Capacity		
				Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.
25	51.5	Light	0-4,999			0.01						0.01
		Medium	5,000-9,999			0.17						0.17
		Heavy	10,000-14,999			0.02						0.02
			15,000-19,999			0.05			0.50			0.55
			20,000-24,999						0.25			0.25
						0.25			0.75			1.00
28	39.3	Light	0-4,999	0.10	0.17	0.02				0.10	0.17	0.02
		Medium	5,000-9,999	0.02	0.20	0.26	0.08	0.06		0.10	0.26	0.26
		Heavy	10,000-14,999		0.03	0.03			0.02		0.03	0.05
			15,000-19,999			0.08		0.10	0.24		0.10	0.32
			20,000-24,999				0.02	0.24	0.27	0.02	0.24	0.27
			25,000-29,999					0.04	0.02		0.04	0.02
				0.12	0.40	0.39	0.10	0.44	0.55	0.22	0.84	0.94
29	63.2	Light	0-4,999	0.08	0.04		0.09			0.17	0.04	
		Medium	5,000-9,999	0.01	0.04	0.06				0.01	0.04	0.06
		Heavy	10,000-14,999		0.01	0.01			0.09		0.01	0.10
			15,000-19,999			0.02			0.28			0.30
			20,000-24,999					0.09	0.18		0.09	0.18
				0.09	0.09	0.09	0.09	0.09	0.55	0.18	0.18	0.84
35	57.2	Light	0-4,999	0.28			0.33			0.61		
		Medium	5,000-9,999	0.05			0.34			0.39		
				0.33			0.67			1.00		
40	1.4	Light	0-4,999	0.57		0.03	0.67			1.24		0.03
		Medium	5,000-9,999	0.09		0.45				0.09		0.45
		Heavy	10,000-14,999			0.06						0.06
			15,000-19,999			0.13						0.13
				0.66		0.67	0.67			1.33		0.67
41	2.0	Light	0-4,999	0.29	0.14		0.33			0.62	0.14	
		Medium	5,000-9,999	0.04	0.17					0.04	0.17	
		Heavy	10,000-14,999		0.03						0.03	
				0.33	0.34		0.33			0.66	0.34	
44	14.0	Light	0-4,999				1.00			1.00		
							1.00			1.00		
All Routes	5419.0	Light	0-4,999	0.1222	0.0974	0.0103	0.1398	0. 18		0.2620	0.2972	0.0103
		Medium	5,000-9,999	0.0884	0.1118	0.1947	0.0828	0.0682	0.0336	0.1712	0.1800	0.2233
		Heavy	10,000-14,999		0.0142	0.1797	0.0046	0.0513	0.1563	0.0046	0.0655	0.3360
			15,000-19,999			0.0490		0.0727	0.2200		0.0727	0.2690
			20,000-24,999				0.0059	0.1066	0.1698	0.0059	0.1066	0.1698
			25,000-29,999					0.0210	0.0244		0.0210	0.0244
			30,000-34,999						0.0056			0.0056
			35,000-39,999						0.0075			0.0075
				0.2106	0.2234	0.4337	0.2331	0.3216	0.6122	0.4437	0.5450	1.0459

Table 41E

INCIDENCE OF PASSENGER BUSES ALONG FEDERAL

AID SYSTEM CLASSIFIED BY GROSS LOADS IMPOSED,

LOADED AND EMPTY.

F. A. Route No.	Length Miles	Weight Groups		Empty Weight Data				Loaded Weight Data				Gross Totals			
				Seating Capacity				Seating Capacity				Seating Capacity			
		Class'n	Class Intervals	Under 8	8-20	21-45	46-60	Under 8	8-20	21-45	46-60	Under 8	8-20	21-45	46-60
				No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	677.6	Light	0-4,999	0.21	0.04			0.09				0.30	0.04		
		Medium	5,000-9,999	0.05	0.02	0.01			0.41	0.13		0.05	0.43	0.14	
		Heavy	10,000-14,999		0.03	0.02			0.04	0.40	0.13		0.07	0.42	0.13
			15,000-19,999			0.10			0.09	0.13			0.09	0.23	
			20,000-24,999			0.05				0.05				0.10	
				0.26	0.09	0.18		0.09	0.54	0.71	0.13	0.35	0.63	0.89	0.13
2	689.4	Light	0-4,999			0.07	0.01							0.07	0.01
		Medium	5,000-9,999		0.24	0.19	0.04	0.11	1.10	0.50		0.11	1.34	0.69	0.04
		Heavy	10,000-14,999		0.14	0.23	0.06		0.50	0.55			0.64	0.78	0.06
			15,000-19,999		0.23	2.59				1.44			0.23	4.03	
					0.61	3.08	0.11	0.11	1.60	2.49		0.11	2.21	5.57	0.11
3	436.5	Light	0-4,999	0.06	0.04							0.06	0.04		
		Medium	5,000-9,999	0.01	0.02	0.01		0.02	0.22			0.03	0.24	0.01	
		Heavy	10,000-14,999		0.03	0.01	0.01	0.02	0.02	0.13	0.02	0.02	0.05	0.14	0.03
			15,000-19,999			0.08				0.03	0.01			0.11	0.01
			20,000-24,999			0.05				0.21				0.26	
				0.07	0.09	0.15	0.01	0.04	0.24	0.37	0.03	0.11	0.33	0.62	0.04
4	53.0	Light	0-4,999		0.20								0.20		
		Medium	5,000-9,999		0.11				2.50				2.61		
		Heavy	10,000-14,999		0.16								0.16		
			15,000-19,999		0.03								0.03		
			20,000-24,999						1.00				1.00		
					0.50				3.50				4.00		
5	184.1	Light	0-4,999	0.08	0.16	0.01	0.02					0.08	0.16	0.01	0.02
		Medium	5,000-9,999	0.02	0.09	0.04	0.08		0.80	0.10		0.02	0.89	0.14	0.08
		Heavy	10,000-14,999		0.12	0.05	0.10		0.30	0.90	1.10		0.42	0.95	1.20
			15,000-19,999		0.03	0.50			0.30	0.20			0.33	0.70	
				0.10	0.40	0.60	0.20		1.40	1.20	1.10	0.10	1.80	1.80	1.30
6	115.8	Light	0-4,999	0.21	0.04							0.21	0.04		
		Medium	5,000-9,999	0.07	0.02	0.01		0.09	0.46			0.16	0.48	0.01	
		Heavy	10,000-14,999		0.03	0.08							0.03	0.08	
				0.28	0.09	0.09		0.09	0.46			0.37	0.55	0.09	
7	91.1	Light	0-4,999		0.17	0.01							0.17	0.01	
		Medium	5,000-9,999		0.10	0.01			0.43	0.43			0.53	0.44	
		Heavy	10,000-14,999		0.16	0.19			1.50				1.66	0.19	
					0.43	0.21			1.93	0.43			2.36	0.64	
8	104.0	Light	0-4,999		1.00								1.00		
		Medium	5,000-9,999		0.56								0.56		
		Heavy	10,000-14,999		0.94				1.25	1.25			2.19	1.25	
					2.50				1.25	1.25			3.75	1.25	
10	111.0	Light	0-4,999		0.64	0.04							0.64	0.04	
		Medium	5,000-9,999		0.36	0.10							0.36	0.10	
		Heavy	10,000-14,999		0.50	0.12							0.50	0.12	
			15,000-19,999		0.10	0.89							0.10	0.89	
			20,000-24,999			0.45				0.80				1.25	
					1.60	1.60				0.80			1.60	2.40	
11	220.7	Light	0-4,999		0.13								0.13		
		Medium	5,000-9,999		0.07								0.07		
		Heavy	10,000-14,999		0.13				0.67				0.80		
					0.33				0.67				1.00		
13	106.4	Light	0-4,999			0.01		0.67				0.67	0.01		
		Medium	5,000-9,999			0.02							0.02		
		Heavy	10,000-14,999			0.30							0.30		
						0.33		0.67				0.67	0.33		

Table 41E (Continued)

F. A. Route No.	Length	Weight Groups		Empty Weight Data Seating Capacity				Loaded Weight Data Seating Capacity				Gross Totals Seating Capacity			
				Under 8	8-20	21-45	46-60	Under 8	8-20	21-45	46-60	Under 8	8-20	21-45	46-60
	Miles	Class'n	Class Intervals	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
15	362.5	Light	0-4,999		0.09	0.01			0.12				0.21	0.01	
		Medium	5,000-9,999		0.05	0.01			0.12	0.35			0.17	0.36	
		Heavy	10,000-14,999		0.07	0.02			0.24				0.31	0.02	
			15,000-19,999		0.02	0.13			0.23	0.12			0.25	0.25	
			20,000-24,999			0.07				0.35				0.42	
					0.23	0.24			0.71	0.82			0.94	1.06	
16	329.9	Light	0-4,999			0.01								0.01	
		Medium	5,000-9,999			0.02			0.91				0.91	0.02	
		Heavy	10,000-14,999			0.03			0.18				0.18	0.03	
			15,000-19,999			0.30				0.55				0.85	
						0.36			1.09	0.55			1.09	0.91	
17	75.2	Light	0-4,999		0.40								0.40		
		Medium	5,000-9,999		0.22					2.00			0.22	2.00	
		Heavy	10,000-14,999		0.31								0.31		
			15,000-19,999		0.07				1.00				1.07		
					1.00				1.00	2.00			2.00	2.00	
19	63.2	Light	0-4,999		0.14	0.07							0.14	0.07	
		Medium	5,000-9,999		0.08	0.19			0.18	0.18			0.26	0.37	
		Heavy	10,000-14,999		0.11	0.24			0.36				0.47	0.24	
			15,000-19,999		0.03	1.73				0.91			0.03	2.64	
			20,000-24,999			0.87				0.91				1.78	
					0.36	3.10			0.54	2.00			0.90	5.10	
20	61.9	Light	0-4,999		0.08	0.01			0.20				0.28	0.01	
		Medium	5,000-9,999		0.04	0.02			0.20	0.60			0.24	0.62	
		Heavy	10,000-14,999		0.06	0.03							0.06	0.03	
			15,000-19,999		0.02	0.34			0.40				0.42	0.34	
					0.20	0.40			0.80	0.60			1.00	1.00	
21	108.3	Light	0-4,999		0.87	0.05							0.87	0.05	
		Medium	5,000-9,999		0.49	0.13				1.09			0.49	1.22	
		Heavy	10,000-14,999		0.82	2.00				0.55			0.82	2.55	
					2.18	2.18				1.64			2.18	3.82	
22	132.7	Light	0-4,999		0.40								0.40		
		Medium	5,000-9,999		0.22								0.22		
		Heavy	10,000-14,999		0.31								0.31		
			15,000-19,999		0.07								0.07		
					1.00								1.00		
24	165.1	Light	0-4,999	0.11	0.09			0.09				0.20	0.09		
		Medium	5,000-9,999	0.03	0.05				0.27	0.05		0.03	0.32	0.05	
		Heavy	10,000-14,999		0.08	0.09			0.05	0.09			0.13	0.18	
				0.14	0.22	0.09		0.09	0.32	0.14		0.23	0.54	0.23	
40	1.4	Light	0-4,999			0.11								0.11	
		Medium	5,000-9,999			0.31								0.31	
		Heavy	10,000-14,999			4.58								4.58	
						5.00								5.00	
41	2.0	Light	0-4,999												
		Medium	5,000-9,999						0.50				0.50		
		Heavy	10,000-14,999												
									0.50				0.50		
44	14.0	Light	0-4,999		0.20								0.20		
		Medium	5,000-9,999		0.11				0.15	0.08			0.26	0.08	
		Heavy	10,000-14,999		0.19					0.23			0.19	0.23	
					0.50				0.15	0.31			0.65	0.31	
All Routes	5419.0	Light	0-4,999	0.0679	0.2130	0.0072	0.0011	0.0439	0.2440			0.1118	0.4570	0.0072	0.0011
		Medium	5,000-9,999	0.0376	0.1205	0.0635	0.0044	0.0073	0.1470	0.2755		0.0449	0.5675	0.3390	0.0044
		Heavy	10,000-14,999		0.1958	0.1480	0.0028	0.0026	0.1892	0.3250	0.0635	0.0026	0.3850	0.4730	0.0663
			15,000-19,999		0.0129	0.2195			0.0893	0.4245	0.0013		0.1022	0.6440	0.0013
			20,000-24,999			0.0556				0.1196				0.1752	
				0.1055	0.5422	0.4938	0.0083	0.0538	0.9695	1.1446	0.0648	0.1593	1.5117	1.6384	0.0731

Significant data with respect to the tabulation are as follows:

1. Light (rated capacity) trucks.
   a. Three tenths of one percent of all loaded light trucks exceed the gross unit weight restriction (24,000#).
   b. 26.2% of all loaded light trucks are in the light weight group.
   c. 40% of all loaded light trucks are in the medium weight group.
   d. 33.8% of all loaded light trucks are in the heavy weight group, about 77% of this increment being in the group 10,000-14,999.

2. Medium (rated capacity) trucks.
   a. 14.4% of all loaded medium trucks exceed the gross unit weight restriction for two axle trucks (24,000#).
   b. There is a negligible percentage of loaded medium trucks in the light weight group.
   c. 13.6% of all loaded medium trucks are in the medium weight group.
   d. 88.4% of all loaded medium trucks are in the heavy weight group, about 38% of this increment being in the weight group 10,000-14,999.

3. Heavy (rated capacity) trucks.
   a. 38.5% of all loaded heavy trucks exceed the gross unit weight restriction for two axle trucks (24,000#).
   b. There is a negligible percentage of loaded heavy trucks in the light weight group.
   c. About 1.6% of all loaded heavy trucks fall in the medium weight group.
   d. About 98.4% of all loaded heavy trucks fall in the heavy weight group, 14.8% of the increment falling in the group 10,000-14,999, 14.9% in the group 15,000-19,999, 31.2% in the group 20,000-24,999, and 25.5% in the group 25,000-29,999.

4. Tractor-truck and semi-trailer combinations.
   a. About 4.4% of all loaded tractor-truck and semi-trailer combinations exceed the gross unit weight restriction for 3 axle combinations (40,811#).
   b. About 0.4 of one percent of all loaded tractor truck and semi-trailer combinations fall in the light weight group.
   c. About 2.6% of all loaded tractor-truck and semi-trailer combinations fall in the medium weight group.
   d. 97% of all loaded tractor-truck and semi-trailer combinations fall in the heavy weight group, 10% of this increment falling in the group 10,000-14,999, 8.4% falling in the group 15,000-19,999, 14.7% falling in the group 20,000-24,999, 25.8% falling in the group 25,000-29,999, 18.6% falling in the group 30,000-34,999, and 8.9% falling in the group 35,000-39,999.

Further discussion of the other unit classifications is needless, suffice to say, that in general all truck and bus traffic complies with the unit gross weight restrictions now in effect. Most units in the heavier classifications are equipped with three axles, hence the loads carried would exceed the limit for two axle units but would comply generally with the limits set for three axle units.

From the data deriving from the Pit Scale and Loadometer Surveys, we may by correlation assign values giving the tendency in loading practice. The curves showing frequency and axle load distribution are as follows:

PLATE IX A

Average Single Unit Truck Volume On Federal Aid System Showing Gross Weights And Average Maximum Axle Loads.

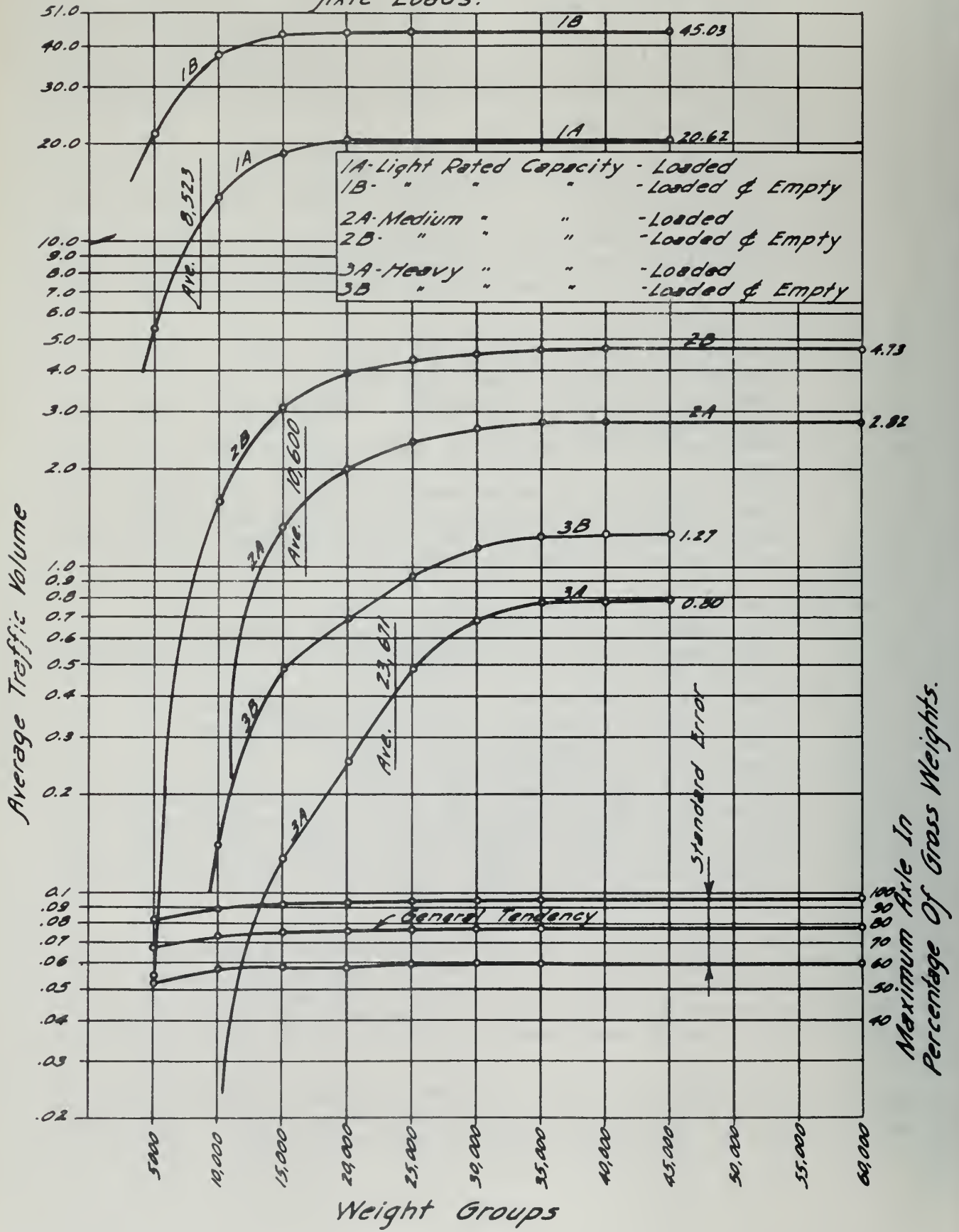


PLATE IX B

Average Traffic Volume Tractor Trucks & Semi-Trailers On Federal Aid System Showing Gross Weights & Maximum Axle Loads.

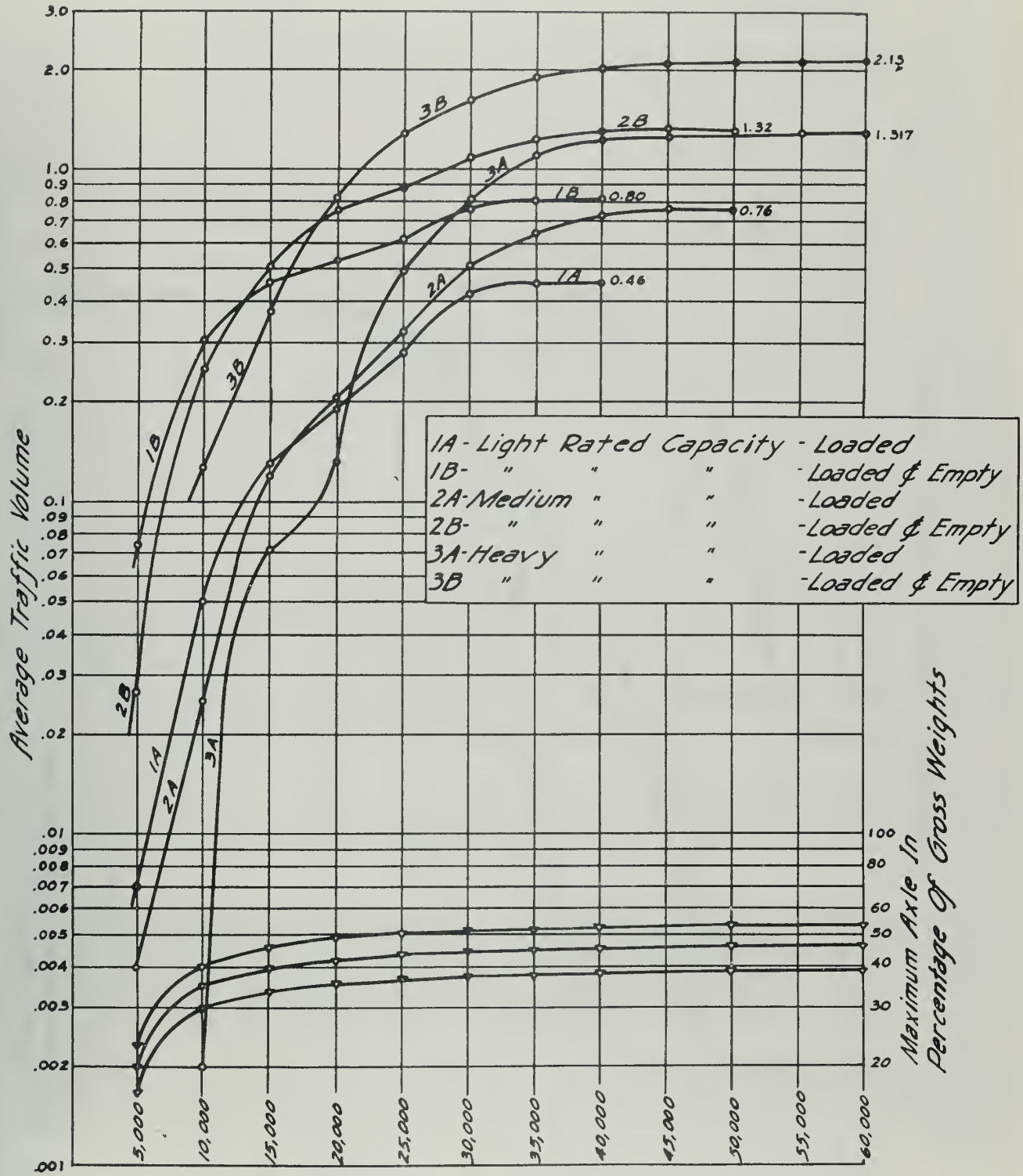


PLATE IX c

Average Traffic Volume Of Trucks, Of Truck & Trailer Combinations Showing Gross Weights & Maximum Axle Weights.

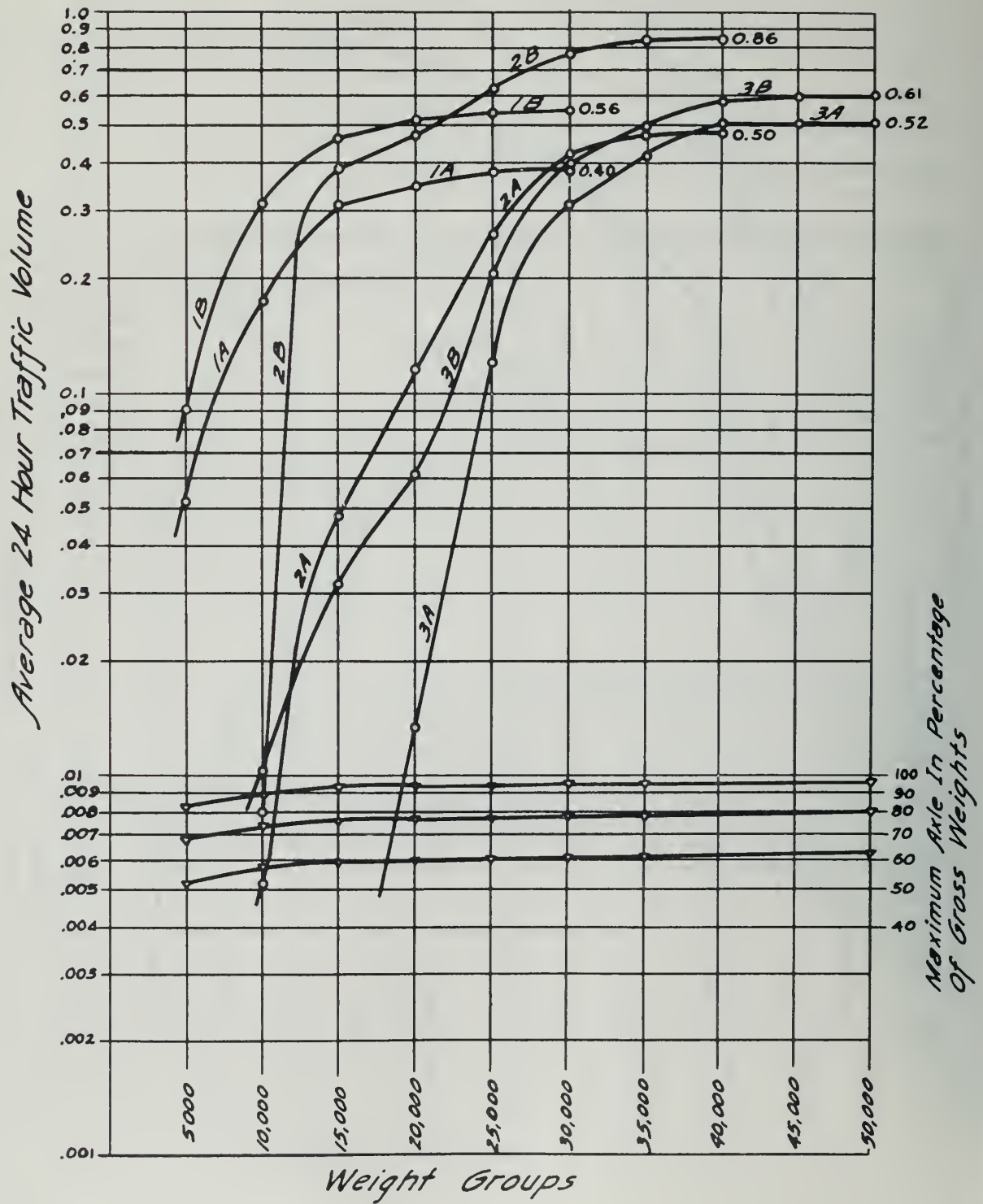
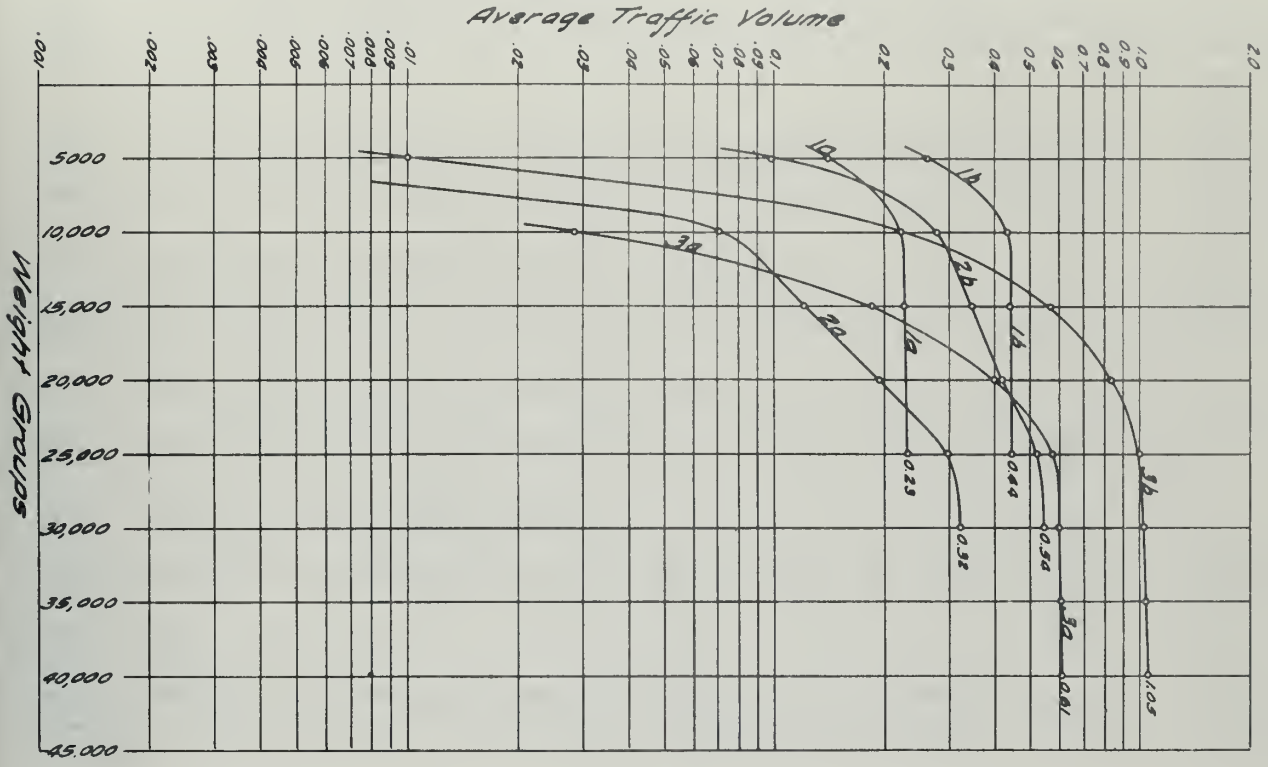


PLATE IX D

Average Traffic Volume Of Trailers, Of Trucks & Trailer Combinations & Gross Weights.



From the graphs we find significant data as follows:

1. Light Trucks
   a. When the gross weight exceeds 22,000 pounds, there is an overload on the rear axle (using 16,800# as the maximum for a two axle truck.)
   b. These overloads occur about 0.9% of the time.

2. Medium Trucks
   a. Axle overloads occur at the rate of 23 per 100 vehicles. If we use the weight restriction for a three axle vehicle, the overload occurs at the rate of 2 per 100 vehicles.

3. Heavy Trucks
   a. On the basis of 16,800 pounds for the heaviest axle of a two axle vehicle axle overloads occur at the rate of 57 per 100 vehicles. On the basis of the weight restriction for a three axle vehicle, the axle overloads occur at the rate of 6 per 100 vehicles.

4. Tractor Truck Semi-trailer Combinations
   a. Using the weight restriction for a three axle combination, axle overloads occur at the rate of 14 per 100 vehicles. Using weight restriction for a four axle combination, the axle overloads occur at the rate of approximately 1 per 100 vehicles.

3.032 Normal Frequencies of Axle Loads on the Federal Aid System

Resolving the data set forth in section 3.031 of this report into axle load frequencies, we find the loads to be concentrated on the Federal Aid System as follows:

Table 42

SHOWING FREQUENCIES OF AXLE LOADS ON THE FEDERAL AID SYSTEM

Vehicle Classification	Rated Capacity	24 Hr. Ave. Annual Traffic Volume	24 Hr. Ave. Annual Traffic Volume (Axles)	Percent of total number of axles with axle loads less than -							
				2000 Pounds	4000 Pounds	6000 Pounds	8000 Pounds	10000 Pounds	12000 Pounds	14000 Pounds	16000 Pounds
Passenger Cars		237	474	100.00							
Single Unit Trucks	Light	45.03	90.3145	41.33	75.82	86.05	92.99	95.97	98.48	99.82	99.94
Single Unit Trucks	Medium	4.73	10.1519	4.86	34.03	54.85	67.24	78.94	89.27	95.16	97.79
Single Unit Trucks	Heavy	1.27	3.0783	1.30	19.01	35.56	53.29	72.96	86.28	94.01	96.55
Tractor Truck Semi-trailers	Light	0.80	2.4335	19.35	60.23	71.40	75.97	81.47	90.80	96.80	99.25
Tractor Truck Semi-trailers	Medium	1.32	3.9774	7.36	37.79	58.54	70.36	75.97	82.69	89.40	95.94
Tractor Truck Semi-trailers	Heavy	2.14	6.4321	1.53	20.41	41.92	59.16	71.41	80.89	88.81	95.27
Tractor Truck Semi-trailers	All Capacities	4.26	12.8430	6.70	33.38	52.68	65.84	74.74	83.34	90.51	96.23
Truck & Trailer Combinations	All Capacities	2.03	8.8079	8.04	27.02	41.22	57.40	75.48	88.89	95.19	96.97
School & Passenger Buses	All Capacities	4.00	8.0000	18.40	50.68	68.07	75.06	81.91	88.29	93.82	97.86
All Motor Vehicles		298.32	607.1956	84.5573	91.7723	94.5692	96.5037	97.7830	98.8570	99.5100	99.7848

Table 42 (Continued)

Vehicle Classification	Rated Capacity	24 Hr. Ave. Annual Traffic Volume	24 Hr. Ave. Annual Traffic Volumes (Axles)	Percent of total number of axles with axle loads less than -										
				18000 Pounds	20000 Pounds	22000 Pounds	24000 Pounds	26000 Pounds	28000 Pounds	30000 Pounds	32000 Pounds	34000 Pounds	36000 Pounds	38000 Pounds	40000 Pounds
Passenger Cars		237	474												
Single Unit Trucks	Light	45.03	90.3145	99.99	100.00	100.00									
Single Unit Trucks	Medium	4.73	10.1519	99.10	99.84	99.95	99.96	100.00							
Single Unit Trucks	Heavy	1.27	3.0783	98.82	99.44	99.76	99.76	99.91	99.91	100.00					
Tractor Truck Semi-trailers	Light	0.80	2.4335	99.59	99.59	99.59	100.00								
Tractor Truck Semi-trailers	Medium	1.32	3.9774	98.95	99.72	99.93	100.00								
Tractor Truck Semi-trailers	Heavy	2.14	6.4321	98.03	99.03	99.29	99.58	99.66	99.91	99.91	99.91	99.91	99.95	99.95	100.00
Tractor Truck Semi-trailers	All Capacities	4.26	12.8430	98.61	99.35	99.54	99.79	99.83	99.95	99.95	99.95	99.95	99.97	99.97	100.00
Truck & Trailer Combinations	All Capacities	2.03	8.8079	98.20	99.73	100.00									
School & Passenger Buses	All Capacities	4.00	8.0000	99.16	100.00										
All Motor Vehicles		298.32	607.1956	99.9108	99.9769	99.9883	99.9937	99.9959	99.9984	99.9984	99.9984	99.9984	99.9989	99.9989	100.0000

Significant data deriving from the tabulation are as follows:

A. Single Unit Trucks

1. Light rated capacity ($1\frac{1}{2}$ tons or under.)

Most axle loads are less than 2,000 pounds. Approximately 0.04% of all axle loads in the class exceeds the legal limit of 16,800 pounds concentrated on the surface of the road.

2. Medium rated capacity (over $1\frac{1}{2}$ tons and less than 5 tons).

Most axle loads occur in the class interval 2,000-3,999 pounds. Approximately 1.7% of all axle loads in the class exceeds 16,800 pounds.

3. Heavy rated capacity (5 tons and over).

Most axle loads occur in the class interval 8,000-9,999 pounds. Approximately 2.5% of all axle loads exceeds the legal limit, 16,800.

B. Tractor Truck Semi-trailer Combinations

Most axle loads occur in the class interval 2,000-3,999 pounds. Approximately 2.8% of all axle loads in the class exceeds the legal limit.

C. Truck and Trailer Combinations

Most axle loads occur in the class interval 2,000-3,999 pounds. Approximately 2.5% of all axle loads in the class exceeds the legal limit of 16,800 pounds.

D. Busses

Most axle loads occur in the class interval 2,000-3,999 pounds. Approximately 1.6% of all axle loads in the class exceeds the legal limit of 16,800 pounds.

E. All Traffic

Most axle loads occur in the class interval 0-1,999 pounds. Approximately 0.2% of all axle loads in the Federal Aid System exceeds the legal limit of 16,800 pounds.

3.04 Classification of Mail Routes by Increments of Traffic Volumes and System Designation

Of the total roads now existing in rural areas (65,730.3 miles) 17,254.8 miles serve to facilitate the delivery of the U. S. Mails. This mileage is distributed among the several systems as follows:

System Designation	Mileage on Mail Routes	Percent of Each Designated System	Percent of Total Rural Mileage
Federal Aid	2,363.0	43.6	3.6
State Secondary	2,022.0	61.6	3.1
Land Service	12,869.8	22.6	26.3
Totals	17,254.8		

More specific and detailed information concerning the use of each of the several systems is as follows:

3.041 Road Sections of the Federal Aid System Serving Rural Postal Deliveries

As shown above, 43.6% of the Federal Aid System serves to facilitate rural mail deliveries. It is interesting to note that the average traffic volume for the total length serving mail deliveries is but 5% in excess of that in evidence over the total length of the Federal Aid System. Detailed information with respect to mileages, surface types and average traffic volumes is as follows:

Tabla 45a

Mileagee Used for Rural Postal Delivary Classified By

Surfaca Type and Avarage Traffic Volume

County	Mail Route Clasaification	Fedaral Aid System																Total Mileage	
		Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved			
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes					20.8	553	12.9	277					3.1	45	3.4	132	40.2	390
	Rural Mail					9.8	683	15.8	410			2.0	218			2.2	326	29.8	481
Flathead	All Routae					30.6	595	28.7	350			2.0	218	3.1	45	5.6	208	70.0	430
	Star Routae			0.5	723	53.5	572	24.1	593					6.6	45	1.5	35	86.2	529
	Rural Mail																		
Lake	All Routea			0.5	723	53.5	572	24.1	593					6.6	45	1.5	35	86.2	529
	Star Routee					2.7	240	8.7	51	6.6	198			30.7	67	18.5	61	67.2	83
	Rural Mail									1.6	83					6.9	31	8.5	41
Lincoln	All Routee					2.7	240	8.7	51	8.2	176			30.7	67	25.4	52	75.7	79
	Star Routee			0.5	723	77.0	555	45.7	400	6.6	198			40.4	62	23.4	70	193.6	345
	Rural Mail					9.8	683	15.8	410	1.6	83	2.0	218			9.1	102	38.3	383
District #1	All Routae			0.5	723	86.8	570	61.5	402	8.2	176	2.0	218	40.4	62	32.5	78	231.9	350
	Star Routes							2.7	592									2.7	592
	Rural Mail							10.5	537									10.5	537
Blaine	All Routae							13.2	548									13.2	548
	Star Routee					15.3	332	43.3	165									58.6	208
	Rural Mail																		
Glaciar	All Routee					15.3	332	43.3	165									58.6	208
	Star Routee					1.3	317											1.3	317
	Rural Mail					1.0	317	8.7	347									9.7	344
Hill	All Routes					2.3	317	8.7	347									11.0	341
	Star Routes					1.0	128	4.0	177									5.0	167
	Rural Mail					1.0	128	4.0	177									5.0	167
Liberty	All Routae					1.0	128	4.0	177									5.0	167
	Star Routes					6.0	195	10.4	234									16.4	220
	Rurel Mail																		
Toole	All Routee					6.0	195	10.4	234									16.4	220
	Ster Routes					23.6	287	60.4	197									84.0	222
	Rural Mail					1.0	317	19.2	451									20.2	444
Diatrict #2	All Routes					24.6	288	79.6	259									104.2	265
	Star Routes							40.2	157									40.2	157
	Rural Mail																		
Daniels	All Routes							40.2	157									40.2	157
	Star Routas							1.6	498							29.8	46	31.4	69
	Rural Mail																		
Phillips	All Routee							1.6	498							29.8	46	31.4	69
	Star Routas							49.2	189									49.2	189
	Rural Mail					0.7	260	21.5	251									22.2	251
Roosevalt	All Routas					0.7	260	70.7	208									71.4	208
	Star Routae					2.8	160	2.0	193									4.8	174
	Rural Mail							9.7	190	3.0	96					9.8	79	22.5	129
Sharidan	All Routas					2.8	160	11.7	191	3.0	96					9.8	79	27.3	137
	Star Routae					17.6	1830	16.1	480									33.7	1184
	Rural Mail							1.0	557									1.0	557
Valley	All Routes					17.6	1830	17.1	486									34.7	1166
	Ster Routee					20.4	1600	109.1	225							29.8	46	159.3	367
	Rural Mail					0.7	260	32.2	242	3.0	96					9.8	79	45.7	198
Diatrict #3	All Routes					21.1	1554	141.3	230	3.0	96					39.6	54	205.0	329
	Star Routae			0.3	983	17.3	285	82.5	204									100.1	220
	Rural Mail																		
Dawson	All Routes			0.3	983	17.3	285	82.5	204									100.1	220
	Star Routee							36.8	112							25.4	53	62.2	88
	Rural Mail															1.5	52	1.5	52
McCone	All Routas							36.8	112							26.9	53	63.7	87

Table 43A (Continued)

County	Mail Route Classification	Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes																		
	Rural Mail																		
Prairie	All Routes																		
	Star Routes					11.5	711	1.5	91	4.1	141					10.8	37	27.9	333
	Rural Mail					2.3	545	6.8	290							1.5	11	10.6	306
Richland	All Routes					13.8	684	8.3	254	4.1	141					12.3	33	38.5	325
	Star Routes					0.6	305											0.6	305
	Rural Mail					4.0	280											4.0	280
Wibaux	All Routes					4.6	284											4.6	284
	Star Routes			0.3	983	29.4	452	120.8	174	4.1	141					36.2	48	190.8	193
	Rural Mail					6.3	377	6.8	290							3.0	31	16.1	275
District #4	All Routes			0.3	983	35.7	439	127.6	180	4.1	141					39.2	46	206.9	199
	Star Routes					15.6	317	10.6	166	11.6	260					50.3	28	88.1	126
	Rural Mail			1.2	822	8.3	507	8.8	340									18.3	448
Fergus	All Routes			1.2	822	23.9	383	19.4	245	11.6	260					50.3	28	106.4	181
	Star Routes							46.1	108	53.2	78					37.6	55	136.9	82
	Rural Mail																		
Garfield	All Routes							46.1	108	53.2	78					37.6	55	136.9	82
	Star Routes							24.7	94									24.7	94
	Rural Mail																		
Petroleum	All Routes							24.7	94									24.7	94
	Star Routes					15.6	317	81.4	111	64.8	113					87.9	40	249.7	100
	Rural Mail			1.2	822	8.3	507	8.8	340									18.3	448
District #5	All Routes			1.2	822	23.9	383	90.2	133	64.8	113					87.9	40	268.0	124
	Star Routes					41.1	521	33.3	359	20.6	103	2.9	126					97.9	366
	Rural Routes	2.4	614			0.1	610	16.1	299									18.6	341
Cascade	All Routes	2.4	614			41.2	522	49.4	340	20.6	103	2.9	126					116.5	361
	Star Routes																		
	Rural Routes							11.6	411									11.6	411
Chouteau	All Routes							11.6	411									11.6	411
	Star Routes																		
	Rural Routes					3.0	274	11.4	246									14.4	252
Judith Basin	All Routes					3.0	274	11.4	246									14.4	252
	Star Routes							8.9	113									8.9	113
	Rural Routes							11.7	406									11.7	406
Pondera	All Routes							20.6	280									20.6	280
	Star Routes							6.7	167									6.7	167
	Rural Routes							9.7	397									9.7	397
Teton	All Routes							16.4	303									16.4	303
	Star Routes					41.1	521	48.9	288	20.6	103	2.9	126					113.5	335
	Rural Routes	2.4	614			3.1	285	60.5	347									66.0	354
District #6	All Routes	2.4	614			44.2	504	109.4	321	20.6	103	2.9	126					179.5	343
	Star Routes																		
	Rural Routes							9.5	186									9.5	186
Broadwater	All Routes							9.5	186									9.5	186
	Star Routes					51.4	563	4.6	784									56.0	581
	Rural Routes					4.9	700											4.9	700
Jafferson	All Routes					56.3	575	4.6	784									60.9	591
	Star Routes					35.7	557	54.0	298							7.7	17	97.4	370
	Rural Routes																		
Lewis & Clark	All Routes					35.7	557	54.0	298							7.7	17	97.4	370
	Star Routes					87.1	558	58.6	337							7.7	17	153.4	448
	Rural Routes					4.9	700	9.5	186									14.4	361
District #7	All Routes					92.0	565	68.1	316							7.7	17	167.8	441
	Star Routes					8.8	421	3.1	301	5.6	51							17.5	282
	Rural Routes																		
Granita	All Routes					8.8	421	3.1	301	5.6	51							17.5	282

Table 43A (Continued)

County	Mail Route Classification	Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes																		
	Rural Routes																		
Mineral	All Routes																		
	Star Routes					31.6	738	11.3	595	3.2	100			1.7	100	25.0	81	72.8	392
	Rural Routes					3.6	1700											3.6	1700
Missoula	All Routes					35.2	836	11.3	595	3.2	100			1.7	100	25.0	81	76.4	454
	Star Routes																		
	Rural Routes					1.6	701											1.6	701
Powell	All Routes					1.6	701											1.6	701
	Star Routes					28.8	560	6.9	156					10.5	78			46.2	390
	Rural Routes					11.3	321									1.3	89	12.6	297
Ravalli	All Routes					40.1	491	6.9	156					10.5	78	1.3	89	58.8	371
	Star Routes					0.4	407	12.9	136	6.4	90					25.4	93	45.1	108
	Rural Routes																		
Sanders	All Routes					0.4	407	12.9	136	6.4	90					25.4	93	45.1	108
	Star Routes					69.6	623	34.2	307	15.2	78			12.2	81	50.4	87	181.6	333
	Rural Routes					16.5	660									1.3	89	17.8	619
District #8	All Routes					86.1	630	34.2	307	15.2	78			12.2	81	51.7	87	199.4	358
	Star Routes																		
	Rural Routes					9.4	595											9.4	595
Beaverhead	All Routes					9.4	595											9.4	595
	Star Routes			8.0	1244	15.6	558	3.5	299									27.1	727
	Rural Routes					1.3	641											1.3	641
Deer Lodge	All Routes			8.0	1244	16.9	564	3.5	299									28.4	721
	Star Routes			0.1	160	9.9	209	43.7	167	15.9	131	8.9	106			17.2	134	95.7	154
	Rural Routes					4.3	146											4.3	146
Madison	All Routes			0.1	160	14.2	188	43.7	167	15.9	131	8.9	106			17.2	134	100.0	153
	Star Routes			10.7	2010	22.0	538	2.2	1674									34.9	1061
	Rural Routes			3.7	1111	2.0	1324											5.7	1186
Silver Bow	All Routes			14.4	1779	24.0	603	2.2	1674									40.6	1077
	Star Routes			18.8	1674	47.5	476	49.4	244	15.9	131	8.9	106			17.2	134	157.7	453
	Rural Routes			3.7	1111	17.0	571											20.7	668
District #9	All Routes			22.5	1583	64.5	502	49.4	244	15.9	131	8.9	106			17.2	134	178.4	477
	Star Routes					8.3	248	5.9	125									14.2	197
	Rural Routes					21.2	913	1.2	1025									22.4	920
Gallatin	All Routes					29.5	726	7.1	277									36.6	639
	Star Routes							13.0	96									13.0	96
	Rural Routes																		
	Star Routes			0.1	384	43.8	413	34.3	260	5.0	170							83.2	337
	Rural Routes																		
Park	All Routes			0.1	384	43.8	413	34.3	260	5.0	170							83.2	337
	Rural Routes					12.3	575											12.3	575
Sweet Grass	All Routes					12.9	578											12.9	578
	Star Routes																		
	Rural Routes																		
Wheatland	All Routes																		
	Star Routes			0.1	384	52.7	390	53.2	205	5.0	170							111.0	291
	Rural Routes					33.5	790	1.2	1025									34.7	799
District #10	All Routes			0.1	384	86.2	545	54.4	223	5.0	170							145.7	412

Table 43A (Continued)

County	Mail Route Classification	Bituminous Macadam		Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							9.0	490							24.3	38	33.3	160
	Rural Routes																		
Big Horn	All Routes							9.0	490							24.3	38	33.3	160
	Star Routes							8.1	529									8.1	529
	Rural Routes							23.1	645									23.1	645
Carbon	All Routes							31.2	615									31.2	615
	Star Routes							5.0	150									5.0	150
	Rural Routes																		
Golden Valley	All Routes							5.0	150									5.0	150
	Star Routes							23.2	379							0.5	4	23.7	371
	Rural Routes																		
Musselshell	All Routes							23.2	379							0.5	4	23.7	371
	Ster Routes					4.3	597											4.3	597
	Rural Routes					2.2	601											2.2	601
Stillwater	All Routes					6.5	598											6.5	598
	Ster Routes																		
	Rural Routes																		
Treasure	All Routes																		
	Star Routes							38.8	445									38.8	445
	Rural Routes					5.0	992	37.3	790									42.3	814
Yellowstone	All Routes					5.0	992	76.1	614									81.1	637
	Star Routes					4.3	597	84.1	422							24.8	37	113.2	345
	Rural Routes					7.2	872	60.4	735									67.6	750
District #11	All Routes					11.5	769	144.5	552							24.8	37	180.8	496
	Star Routes							38.4	63	11.6	104					1.4	58	51.4	72
	Rural Routes																		
Carter	All Routes							38.4	63	11.6	104					1.4	58	51.4	72
	Star Routes					12.6	572	97.4	137									110.0	187
	Rural Routes																		
Custer	All Routes					12.6	572	97.4	137									110.0	187
	Star Routes							11.6	119	25.3	129							36.9	126
	Rural Routes																		
Fallon	All Routes							11.6	119	25.3	129							36.9	126
	Star Routes							47.3	87							9.1	119	56.4	92
	Rural Routes																		
Powder River	All Routes							47.3	87							9.1	119	56.4	92
	Star Routes					11.0	472	23.1	191							6.6	39	40.7	242
	Rural Routes																		
Rosebud	All Routes					11.0	472	23.1	191							6.6	39	40.7	242
	Star Routes					23.6	526	217.8	118	36.9	121					17.1	83	295.4	149
	Rural Routes																		
District #12	All Routes					23.6	526	217.8	118	36.9	121					17.1	83	295.4	149
	Star Routes			19.7	1633	491.9	552	963.6	221	169.1	118	11.8	111	52.6	66	294.5	64	2003.2	280
	Rural Routes	2.4	614	9.9	1041	108.3	664	214.4	448	4.6	92	2.0	218			23.2	82	359.8	492
STATEWIDE	All Routes	2.4	614	24.6	1516	600.2	573	1178.0	263	173.7	117	13.8	127	52.6	66	317.7	65	2363.0	312

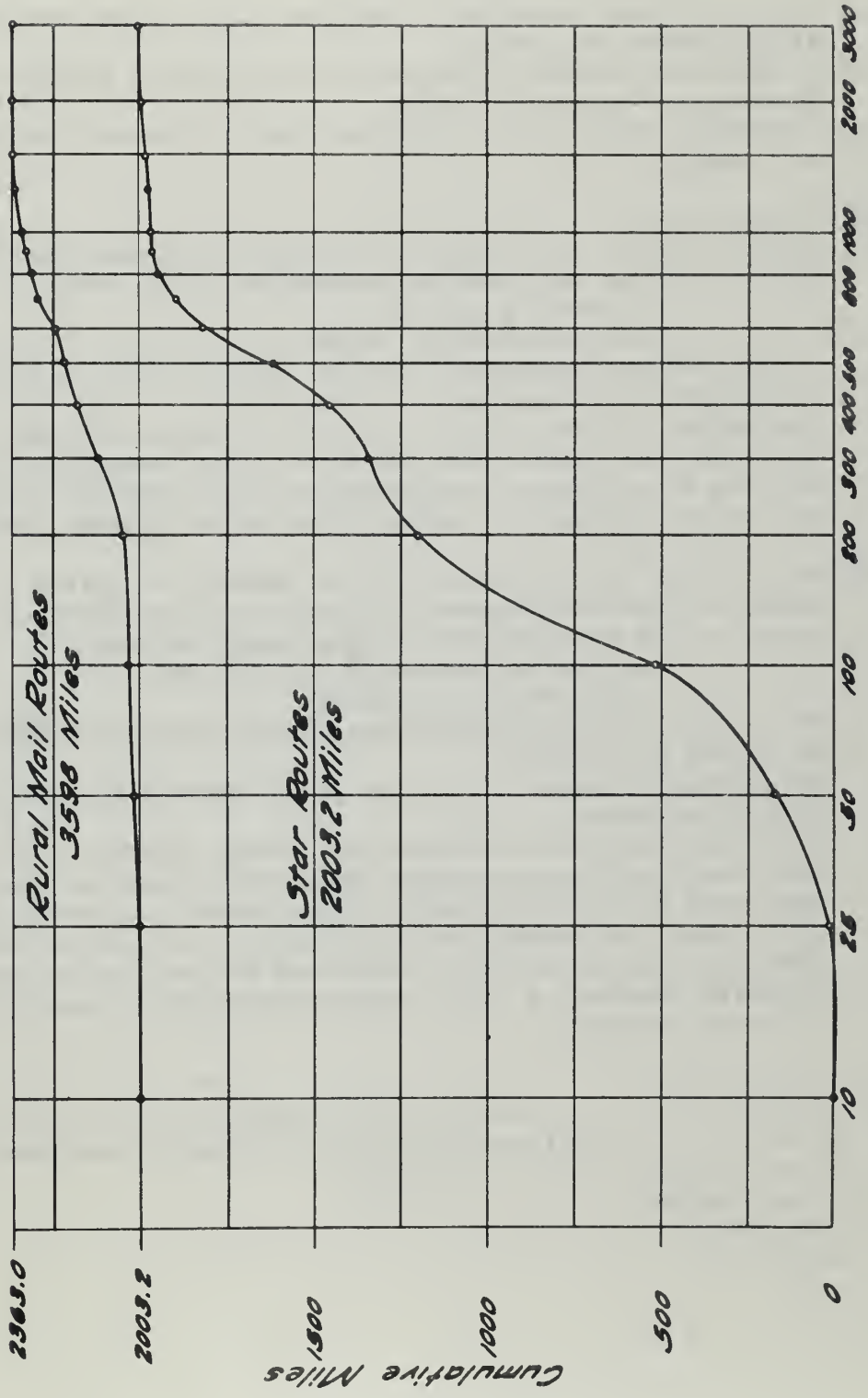
TABLE 43B
TRAFFIC DENSITY CLASSIFICATION OF THOSE
SECTIONS OF THE FEDERAL AID SYSTEM
USED FOR RURAL MAIL DELIVERY

Surface Type	Mail Route Classification	Traffic Volume Groups																	Total Mileage	Average Traffic Volume
		0 - 9 Mi.	10 - 24 Mi.	25 - 49 Mi.	50 - 99 Mi.	100 - 199 Mi.	200 - 299 Mi.	300 - 399 Mi.	400 - 499 Mi.	500 - 599 Mi.	600 - 699 Mi.	700 - 799 Mi.	800 - 899 Mi.	900 - 999 Mi.	1000 - 1249 Mi.	1250 - 1499 Mi.	1500 - 1999 Mi.	2000 - 2999 Mi.		
Bituminous Macadam	Star Routes																			
	Rural Routes										2.4								2.4	614
	All Routes										2.4								2.4	614
Concrete	Star Routes						0.1		0.1	0.1	0.1	0.1	0.1	0.3	4.1	5.9	8.2	0.6	19.7	1633
	Rural Routes										0.1	0.4	0.4	0.7	3.2	0.1			4.9	1041
	All Routes						0.1		0.1	0.1	0.2	0.5	0.5	1.0	7.3	6.0	8.2	0.6	24.6	1514
High Type Bituminous	Star Routes					13.6	30.6	86.7	94.6	138.1	52.4	45.9	10.5	5.0	2.0	2.7	5.3	4.5	491.9	552
	Rural Routes				0.2	3.0	9.1	12.3	3.1	17.2	23.9	20.5	10.7	3.5	1.5	0.8	1.6	0.9	108.3	664
	All Routes				0.2	16.6	39.7	99.0	97.7	155.3	76.3	66.4	21.2	8.5	3.5	3.5	6.9	5.4	600.2	571
Low Type Bituminous	Star Routes				131.1	529.4	113.6	27.6	62.2	64.1	22.2	8.3	2.0	0.7	0.4	0.6	1.2	0.2	963.6	221
	Rural Routes					16.4	51.9	45.3	37.5	13.1	28.7	19.1	1.7	0.5	0.2				214.4	448
	All Routes				131.1	545.8	165.5	72.9	99.7	77.2	50.9	27.4	3.7	1.2	0.6	0.6	1.2	0.2	1178.0	263
Plain Macadam	Star Routes			11.9	45.9	111.3													169.1	118
	Rural Routes				4.6														4.6	92
	All Routes			11.9	50.5	111.3													173.7	117
Plain Gravel	Star Routes				4.1	7.7													11.8	111
	Rural Routes					0.5	1.5												2.0	218
	All Routes				4.1	8.2	1.5												13.8	127
Graded & Drained	Star Routes			6.6	45.1	0.9													52.6	66
	Rural Routes																			
	All Routes			6.6	45.1	0.9													52.6	66
Unimproved	Star Routes	1.3	6.1	136.0	124.9	26.2													294.5	64
	Rural Routes	0.6	2.1	7.2	10.7	2.6													23.2	82
	All Routes	1.9	8.2	143.2	135.6	28.8													317.7	65
All Types	Star Routes	1.3	6.1	154.5	351.1	689.1	144.3	114.3	156.9	202.3	74.7	54.3	12.6	6.0	6.5	9.2	14.7	5.3	2003.2	280
	Rural Routes	0.6	2.1	7.2	16.5	21.0	63.0	57.6	40.6	30.3	55.1	12.6	9.2	9.5	31.1	0.9	1.6	0.9	359.8	492
	All Routes	1.9	8.2	161.7	367.6	710.1	207.3	171.9	197.5	232.6	129.8	66.9	21.8	15.5	37.6	10.1	16.3	6.2	2363.0	313

esolving these data into a graphical presentation we have results as follows:

PLATE X

Sections Of The Federal Aid System Used For Rural Mail Delivery.



Review of the plates and the tabulation discloses the following significant data:

1. Star Routes
   a. Traffic volumes are somewhat less than those manifest on the Federal Aid System with some few exceptions, these being:
      Concrete, 19.7 miles; high type bituminous, 491.9 miles;
      Plain macadam, 169.1 miles; graded and drained, 52.6 miles;
      Unimproved, 294.5 miles.
   b. Traffic volumes range within the same limit as that manifest on the Federal Aid System as a whole.
   c. The greatest mileage falls in the group interval 100-199 as it does on the Federal Aid System as a whole.
   d. The median falls at 171 or 80 less than it does on the Federal Aid System as a whole.

2. Rural Mail Routes
   a. Traffic volumes are considerably in excess of those in evidence on the Federal Aid System with some few exceptions, these being:
      Concrete, 4.9 miles.
      Plain macadam, 4.6 miles.
   b. Traffic volumes range within the same limits as those manifest on the Federal Aid System as a whole.
   c. The greatest mileage falls in the group interval 200-299, i.e., one group above the modal class characteristic of the Federal Aid System as a whole.
   d. Half the mileage bears traffic volumes less than 429 vehicles per day per mile, thus exceeding the median value of the Federal Aid System by 228.

3. All Rural Postal Delivery Routes on the Federal Aid System
   a. Traffic volumes are somewhat in excess of those manifest on the Federal Aid System in its entirety, the notable exception being:
      Low type bituminous, 1,178.0 miles;
      Plain gravel, 13.8 miles.
   b. The traffic ranges within the same limits as does the traffic on the Federal Aid System as a whole.
   c. The greatest mileage falls in the group interval 100-199 as it does on the Federal Aid System.
   d. Half the mileage on the Federal Aid System used for rural postal delivery bears less than 190 vehicles per day; about 61 vehicles less per day per mile than borne by half the mileage on the Federal Aid System as a whole.
   e. Rural Postal deliveries are facilitated by a dustless surfaced length of 1,805.2 miles leaving 317.7 unimproved and awaiting construction.
   f. Generally speaking, a rural postal route bespeaks usage in the higher traffic volume category.

3.042--Road Sections of the State Secondary System Serving Rural Postal Deliveries

Sections of the State Secondary System serving to facilitate rural postal deliveries are set forth as per the following tabulations:

Table 44A

Mileages Used on the State Secondary System for Rural Postal Delivery

Classified by Surface Type and Average Traffic Volume

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							11.0	199					23.6	19			34.6	76
	Rural Mail							3.9	102	2.4	149							6.3	120
Flathead	All Routes							14.9	174	2.4	149			23.6	19			40.9	83
	Star Routes					5.6	141	11.2	177					58.3	66			75.1	88
	Rural Mail																		
Lake	All Routes					5.6	141	11.2	177					58.3	66			75.1	88
	Star Routes													18.1	22			18.1	22
	Rural Mail																		
Lincoln	All Routes													18.1	22			18.1	22
	Star Routes					5.6	141	22.2	188					100.0	47			127.8	76
	Rural Mail							3.9	102	2.4	149							6.3	120
District #1	All Routes					5.6	141	26.1	175	2.4	149			100.0	47			134.1	78
	Star Routes					0.3	277			10.8	107							11.1	112
	Rural Mail																		
Blaine	All Routes					0.3	277			10.8	107							11.1	112
	Star Routes					9.4	545											9.4	545
	Rural Mail																		
Glacier	All Routes					9.4	545											9.4	545
	Star Routes	0.2	377					14.5	100					19.9	43			34.6	69
	Rural Mail																		
Rill	All Routes	0.2	377					14.5	100					19.9	43			34.6	69
	Star Routes							9.8	45					16.2	14			26.0	26
	Rural Mail							4.9	84									4.9	84
Liberty	All Routes							14.7	58					16.2	14			30.9	35
	Star Routes							0.5	30									0.5	30
	Rural Mail																		
Toole	All Routes							0.5	30									0.5	30
	Star Routes	0.2	377			9.7	537	24.8	77	10.8	107			36.1	30			81.6	116
	Rural Mail							4.9	84									4.9	84
District #2	All Routes	0.2	377			9.7	537	29.7	78	10.8	107			36.1	30			86.5	114
	Star Routes													15.0	92			15.0	92
	Rural Mail																		
Daniels	All Routes													15.0	92			15.0	92
	Star Routes							10.4	81					56.7	40			67.1	46
	Rural Mail																		
Phillips	All Routes							10.4	81					56.7	40			67.1	46
	Star Routes													33.1	18			33.1	18
	Rural Mail																		
Roosevelt	All Routes													33.1	18			33.1	18
	Star Routes													7.5	41			7.5	41
	Rural Mail																		
Sheridan	All Routes													7.5	41			7.5	41
	Star Routes			1.7	1825			8.8	71					41.3	61			51.8	121
	Rural Mail													2.1	288			2.1	288
Valley	All Routes			1.7	1825			8.8	71					43.4	72			53.9	127
	Star Routes			1.7	1825			19.2	77					153.6	46			174.5	67
	Rural Mail													2.1	288			2.1	288
District #3	All Routes			1.7	1825			19.2	77					155.7	49			176.6	70
	Star Routes													17.5	34	1.5	12	19.0	32
	Rural Mail																		
Dawson	All Routes													17.5	34	1.5	12	19.0	32
	Star Routes													26.5	10			26.5	10
	Rural Mail																		
McCone	All Routes													26.5	10			26.5	10

Table 44A (Continued)

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							11.4	89					25.7	22			37.1	43
	Rural Mail																		
Prairie	All Routes							11.4	89					25.7	22			37.1	43
	Star Routes													6.7	30			6.7	30
	Rural Mail							6.3	71					34.6	27			40.9	34
Richland	All Routes							6.3	71					41.3	27			47.6	33
	Star Routes							7.7	146					3.2	65			10.9	122
	Rural Mail													2.8	30			2.8	30
Wibeux	All Routes							7.7	146					6.0	49			13.7	103
	Star Routes							19.1	112					79.6	23	1.5	12	100.2	40
	Rural Mail							6.3	71					37.4	27			43.7	33
District #4	All Routes							25.4	102					117.0	24	1.5	12	143.9	38
	Star Routes													23.8	42			23.8	42
	Rural Mail													28.4	85			28.4	85
Fergus	All Routes													52.2	65			52.2	65
	Star Routes													36.5	16			36.5	16
	Rural Mail																		
Garfield	All Routes													36.5	16			36.5	16
	Star Routes							4.9	74					11.5	58			16.4	63
	Rural Mail																		
Petroleum	All Routes							4.9	74					11.5	58			16.4	63
	Star Routes							4.9	74					71.8	31			76.7	34
	Rural Mail													28.4	85			28.4	85
District #5	All Routes							4.9	74					100.2	46			105.1	47
	Star Routes							3.6	18	5.0	53			42.1	23			50.7	26
	Rural Mail							1.0	48									1.0	48
Cascade	All Routes							4.6	25	5.0	53			42.1	23			51.7	26
	Star Routes					2.8	160	8.0	79					104.2	24			115.0	31
	Rural Mail													6.2	21			6.2	21
Chouteau	All Routes					2.8	160	8.0	79					110.4	24			121.2	31
	Star Routes																		
	Rural Mail							1.5	81					2.1	33			3.6	53
Judith Basin	All Routes							1.5	81					2.1	33			3.6	53
	Star Routes							11.1	82					22.7	51			33.8	61
	Rural Mail							3.5	119					2.8	76			6.3	100
Pondera	All Routes							14.6	91					25.5	54			40.1	67
	Star Routes							1.7	127									1.7	127
	Rural Mail							0.9	81									0.9	81
Teton	All Routes							2.6	111									2.6	111
	Star Routes					2.8	160	24.4	75	5.0	53			169.0	27			201.2	35
	Rural Mail							6.9	95					11.1	37			18.0	59
District #6	All Routes					2.8	160	31.3	79	5.0	53			180.1	28			219.2	37
	Star Routes																		
	Rural Mail																		
Broadwater	All Routes																		
	Star Routes													26.3	34			26.3	34
	Rural Mail													3.6	19			3.6	19
Jefferson	All Routes													29.9	32			29.9	32
	Star Routes													65.8	82			65.8	82
	Rural Mail																		
Lewis & Clark	All Routes													65.8	82			65.8	82
	Star Routes													92.1	68			92.1	68
	Rural Mail													3.6	19			3.6	19
District #7	All Routes													95.7	66			95.7	66
	Star Routes													16.3	89			16.3	89
	Rural Mail																		
Granite	All Routes													16.3	89			16.3	89

Table 44A (Continued)

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macedam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes													78.8	23			78.8	23
	Rural Mail					7.2	349											7.2	349
Missoula	All Routes					7.2	349							78.8	23			86.0	50
	Star Routes							11.5	57					36.7	26			48.2	33
	Rural Mail																		
Powell	All Routes							11.5	57					36.7	26			48.2	33
	Star Routes																		
	Rural Mail									0.3	67							0.3	67
Ravalli	All Routes									0.3	67							0.3	67
	Star Routes									0.4	108			18.3	24			18.7	26
	Rural Mail																		
Sanders	All Routes									0.4	108			18.3	24			18.7	26
	Star Routes							11.5	57	0.4	108			150.1	31			162.0	33
	Rural Mail					7.2	349			0.3	67							7.5	338
District #8	All Routes					7.2	349	11.5	57	0.7	90			150.1	31			169.5	47
	Star Routes							4.4	62					139.0	51	1.5	7	144.9	51
	Rural Mail							2.6	95					5.1	71			7.7	79
Beaverhead	All Routes							7.0	74					144.1	52	1.5	7	152.6	53
	Star Routes													14.5	52			14.5	52
	Rural Mail			0.3	445	2.8	197	2.2	32									5.3	143
Deer Lodge	All Routes			0.3	445	2.8	197	2.2	32					14.5	52			19.8	76
	Star Routes													10.5	62			10.5	62
	Rural Mail																		
Madison	All Routes													10.5	62			10.5	62
	Star Routes					3.4	130											3.4	130
	Rural Mail					3.8	96											3.8	96
Silver Bow	All Routes					7.2	112											7.2	112
	Star Routes					3.4	130	4.4	62					164.0	52	1.5	7	173.3	53
	Rural Mail			0.3	445	0.6	139	4.8	61					5.1	71			16.8	102
District #9	All Routes			0.3	445	10.0	136	9.2	61					169.1	53	1.5	7	190.1	57
	Star Routes			58.2	169	11.6	370											70.0	203
	Rural Mail					11.5	563	2.6	118					11.7	96			26.0	305
Gallatin	All Routes			58.2	169	23.3	466	2.8	118					11.7	96			96.0	231
	Star Routes																		
	Rural Mail													4.2	29			4.2	29
Park	All Routes													4.2	29			4.2	29
	Star Routes					0.6	235	8.0	172					12.1	85			20.7	123
	Rural Mail																		
Sweet Grass	All Routes					0.6	235	8.0	172					12.1	85			20.7	123
	Star Routes							6.4	85	12.4	67			25.2	11			44.0	38
	Rural Mail																		
Meagher	All Routes							6.4	85	12.4	67			25.2	11			44.0	38
	Star Routes																		
	Rural Mail																		
Wheatland	All Routes																		
	Star Routes			58.2	169	12.4	363	14.4	133	12.4	67			37.3	35			134.7	137
	Rural Mail					11.5	563	2.8	118					15.9	78			30.2	266
District #10	All Routes			58.2	169	23.9	459	17.2	131	12.4	67			53.2	48			164.9	160
	Star Routes							2.4	33					11.3	7			13.7	12
	Rural Mail							3.3	144					12.7	108			16.0	177
Big Horn	All Routes							5.7	271					24.0	60			29.7	100
	Star Routes					1.2	279	4.7	222	0.3	200			49.2	93			55.4	109
	Rural Mail																		
Carbon	All Routes					1.2	279	4.7	222	0.3	200			49.2	93			55.4	109

Table 44A (Continued)

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Milage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							0.6	68					20.8	9	8.5	5	29.9	9
	Rural Mail													10.1	36			10.1	36
Goldan Valley	All Routes							0.6	68					30.9	18	8.5	5	40.0	16
	Star Routes																		
	Rural Mail																		
Musselshell	All Routes																		
	Star Routes					19.2	267	2.3	42	1.5	23			24.5	34			47.5	128
	Rural Mail													4.0	24			4.0	24
Stillwater	All Routes					19.2	267	2.3	42	1.5	23			28.5	33			51.5	120
	Star Routes													0.5	69			0.5	69
	Rural Mail																		
Treasure	All Routes													0.5	69			0.5	69
	Star Routes					0.7	218							7.6	39			8.3	54
	Rural Mail	1.5	260			2.3	198							15.5	54			19.3	67
Yellowstone	All Routes	1.5	260			3.0	201							23.1	49			27.6	77
	Star Routes					21.1	266	10.0	126	1.8	53			113.9	53	6.5	5	155.3	84
	Rural Mail	1.5	260			2.3	198	3.3	444					42.3	63			49.4	101
District #11	All Routes	1.5	260			23.4	259	13.3	204	1.8	53			156.2	56	8.5	5	204.7	88
	Star Routes													52.8	16			52.8	16
	Rural Mail																		
Carter	All Routes													52.8	16			52.8	16
	Star Routes							10.0	21					77.8	11			87.8	12
	Rural Mail																		
Custer	All Routes							10.0	21					77.8	11			87.8	12
	Star Routes							4.2	36					19.9	108			24.1	95
	Rural Mail													2.0	42			2.0	42
Fallon	All Routes							4.2	36					21.9	102			26.1	91
	Star Routes									4.2	35			55.3	27			59.5	28
	Rural Mail																		
Powder River	All Routes									4.2	35			55.3	27			59.5	28
	Star Routes							14.1	54					91.4	36			105.5	38
	Rural Mail																		
Rosebud	All Routes							14.1	54					91.4	36			105.5	38
	Star Routes							28.3	40	4.2	35			297.2	29			329.7	30
	Rural Mail													2.0	42			2.0	42
District #12	All Routes							28.3	40	4.2	35			299.2	29			331.7	30
	Star Routes	0.2	377	59.9	216	55.0	309	183.2	93	34.6	73			1464.7	39	11.5	6	1809.1	59
	Rural Mail	1.5	260	0.3	445	27.6	375	32.9	122	2.7	140			147.9	60			212.9	113
STATEWIDE	All Routes	1.7	274	60.2	217	82.6	331	216.1	97	37.3	78			1612.6	41	11.5	6	2022.0	65

Table 44B

Traffic Density Classification of Those Sections

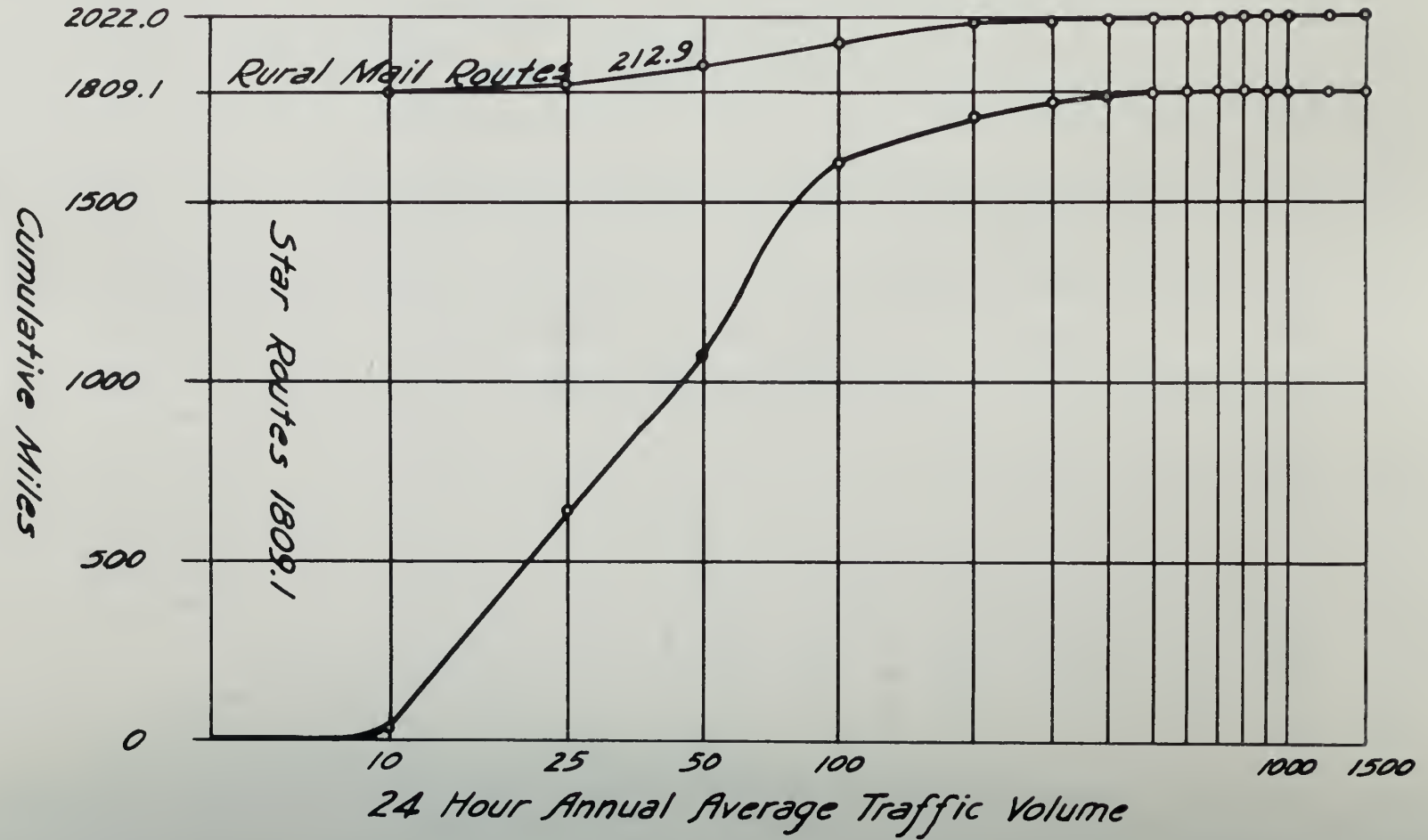
of the State Secondary System used

for Rural Mail Delivery

Surface Type	Mail Route Classification	0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	Total Mileage	Average Traffic Volume
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
	Star Routes							0.2									0.2	377
	Rural Routes						1.5										1.5	260
Concrete	All Routes						1.5	0.2									1.7	274
	Star Routes					41.3	14.8	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.8	0.8	59.9	216
High Type	Rural Routes								0.3								0.3	445
Bituminous	All Routes					41.3	14.8	0.3	0.6	0.3	0.3	0.4	0.3	0.3	0.8	0.8	60.2	217
	Star Routes				2.0	9.4	17.6	14.7	5.0	3.6	2.7						55.0	309
Low Type	Rural Routes				2.0	10.2	3.3	4.0	2.0	0.7	0.7	0.7	0.7	0.7	1.8	0.8	27.6	375
Bituminous	All Routes				4.0	19.6	20.9	18.7	7.0	4.3	3.4	0.7	0.7	0.7	1.8	0.8	82.6	331
	Star Routes		10.4	26.0	88.5	48.8	9.5										183.2	93
Plain	Rural Routes		0.7	1.9	16.1	11.3	0.5	0.5	0.5	0.5	0.5	0.4					32.9	122
Macadam	All Routes		11.1	27.9	104.6	60.1	10.0	0.5	0.5	0.5	0.5	0.4					216.1	97
	Star Routes		0.9	8.3	17.4	7.9	0.1										34.6	73
Plain	Rural Routes			0.1	0.2	2.4											2.7	140
Gravel	All Routes		0.9	8.4	17.6	10.3	0.1										37.3	78
	Star Routes	21.4	606.0	391.2	432.0	14.1											1464.7	39
	Rural Routes		21.3	57.7	39.2	28.1	0.6	0.6	0.4								147.9	60
Unimproved	All Routes	21.4	627.3	448.9	471.2	42.2	.0.6	0.6	0.4								1612.6	41
	Star Routes	10.3	1.2														11.5	6
	Rural Routes																	
Primitive	All Routes	10.3	1.2														11.5	6
	Star Routes	31.7	618.5	425.5	539.9	121.5	42.0	15.2	5.3	3.9	3.0	0.4	0.3	0.3	0.8	0.8	1809.1	59
	Rural Routes		22.0	59.7	57.5	52.0	5.9	5.1	3.2	1.2	1.2	1.1	0.7	0.7	1.8	0.8	212.9	113
All Types	All Routes	31.7	640.5	485.2	597.4	173.5	47.9	20.3	8.5	5.1	4.2	1.5	1.0	1.0	2.6	1.6	2022.0	65

PLATE XI

Sections Of The State Secondary System Used For Rural Mail Delivery



Significant data deriving from the graphs and tabulations are as follows:

1. Star Routes

a. Traffic volumes over those sections of the State Secondary System used for the Star Mail Route deliveries are exactly the same as the grand average for the whole of the State Secondary System. Variation by surface types are as follows:

Concrete, 0.2 miles @ 377, less than average for concrete over the whole system.
High type bituminous, 59.9 miles @ 216, less than average.
Low type bituminous, 55.0 miles @ 309, less than average.
Plain macadam, 183.2 miles @ 93, the same as the average for the improved sections of the State Secondary System.
Plain gravel, 34.6 miles @ 39, more than average.
Unimproved, 1,464.7 miles @ 39, more than average.
Primitive, 11.5 miles @ 6, more than average.

b. Traffic volumes range within the same limits generally speaking as for the State Secondary System as a whole.

c. The greatest mileage falls in the group interval 10-24 as it does on the system as a whole.

d. Half the mileage bears less than 40 vehicles per mile per day as opposed to a median figure of 37 on the system as a whole.

2. Rural Mail Routes

a. Traffic volumes are considerably in excess of those manifest on the State Secondary System as a whole with the exception of concrete paving.

b. Traffic volumes range within the same limits as those in evidence on the State Secondary System as a whole.

c. The greatest mileage falls in the group interval 25-49 as opposed to the interval 10-24 on the State Secondary System as a whole.

d. Half the mileage bears less than 72 vehicles per mile per day as opposed to a median figure of 40 on the State Secondary System as a whole.

3. All Rural Post Roads on the State Secondary System

a. Traffic volumes as a whole are somewhat in excess of those generally in evidence on the State Secondary System, the exception being:

Concrete paving, 1.7 miles
Low type bituminous, 82.6 miles

b. Traffic volumes range within the same limits as those manifest on the State Secondary System as a whole.

c. The greatest mileage falls in the group 10-24 as it does on the system as a whole.

d. Half the mileage bears less than 42 vehicles per mile per day which is 5 in excess of the median figure for the State Secondary System as a whole.

e. Rural postal deliveries on the State Secondary System are afforded on improved dustless surface 144.5 miles in length, a surfaced mileage of 397.9 miles, leaving a total of 1,624 miles not improved to present acceptable standards.

f. Generally speaking, rural mail deliveries indicate usage in the higher traffic volume categories.

.043 Road Sections of the Land Service System Serving Rural Postal Deliveries

Road sections of the Land Service System used for rural postal deliveries are set forth on the following page.

Table 45A

* Improved to acceptable standards.

Milesages on the Land Service System used for Rural Postal Delivery

Classified by Surface Type and Average Traffic Volume.

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes																	•3.9	42
	" "					•3.9	42	21.9	68	3.8	24			38.9	6	2.0	3	66.6	27
	Rural Mail							45.6	70	75.8	34	2.4	19	76.5	23	0.9	1	201.2	38
Flathead	All Routes					•3.9	42	67.5	70	79.6	34	2.4	19	115.4	17	2.9	2	271.7	35
	Star Routes							0.7	77	6.7	70	11.6	16	25.4	34	1.2	1	45.6	35
	Rural Mail							10.4	108	23.7	56	8.1	26	127.6	24	7.8	7	177.6	33
Lake	All Routes							11.1	106	30.4	59	19.7	20	153.0	26	9.0	6	223.2	33
	Star Routes							3.3	22	18.6	32			48.8	13			70.7	18
	Rural Mail									5.1	17			16.3	10			21.4	12
Lincoln	All Routes							3.3	22	23.7	29			65.1	12			92.1	17
	Star Routes																	•3.9	42
	" "					•3.9	42	25.9	62	29.1	40	11.6	16	113.1	15	3.2	2	182.9	25
	Rural Mail							56.0	77	104.6	38	10.5	24	220.4	23	8.7	6	400.2	34
District #1	All Routes					•3.9	42	81.9	72	133.7	38	22.1	20	333.5	20	11.9	5	587.0	31
	Star Routes									17.4	42	83.0	30	140.6	18	29.5	7	270.5	22
	Rural Mail									11.3	32	21.7	32	69.4	21	32.6	3	135.0	19
Blaine	All Routes									28.7	38	104.7	30	210.0	19	62.1	5	405.5	21
	Star Routes									0.9	8	14.8	22	41.2	27	9.0	8	65.9	23
	Rural Mail																		
Glacier	All Routes									0.9	8	14.8	22	41.2	27	9.0	8	65.9	23
	Star Routes									12.2	92	93.3	50	114.9	19	47.3	3	367.7	30
	Rural Mail							0.4	63	5.0	37	14.9	20	115.4	15	105.7	2	241.4	10
Hill	All Routes							0.4	63	17.2	76	108.2	46	230.3	17	153.0	2	509.1	21
	Star Routes									2.2	18	11.3	10	122.4	11	5.9	1	141.8	11
	Rural Mail													59.8	17	31.5	2	91.3	12
Liberty	All Routes									2.2	18	11.3	10	182.2	13	37.4	2	233.1	11
	Star Routes									25.9	34	84.6	38	98.1	13	15.3	3	223.9	24
	Rural Mail																		
Toole	All Routes									25.9	34	84.6	38	98.1	13	15.3	3	223.9	24
	Star Routes									58.6	47	287.0	38	517.2	16	107.0	4	969.8	23
	Rural Mail							0.4	63	16.3	34	36.6	27	244.6	17	169.8	2	467.7	13
District #2	All Routes							0.4	63	74.9	44	323.6	37	761.8	16	276.8	3	1437.5	20
	Star Routes							26.6	56	20.4	29	38.6	23	151.1	13	10.4	3	247.1	20
	Rural Mail							20.6	42	6.7	32	4.0	41	42.4	9	1.7	1	75.4	22
Daniels	All Routes							47.2	50	27.1	30	42.6	25	193.5	12	12.1	3	322.5	20
	Star Routes							4.4	172			88.6	18	237.1	14	85.6	2	415.7	14
	Rural Mail													35.3	15			35.3	15
Phillips	All Routes							4.4	172			88.6	18	272.4	14	85.6	2	451.0	14
	Star Routes									45.8	39	15.4	17	80.0	23	22.8	3	164.0	24
	Rural Mail									•2.7	97							•2.7	97
	" "									9.0	26	55.9	23	137.3	9	12.3	2	214.5	13
Roosevelt	All Routes									57.5	40	71.3	22	217.3	14	35.1	3	381.2	18
	Star Routes									10.5	56	30.8	34	98.8	19	4.0	8	144.1	25
	Rural Mail							3.5	130	11.5	57	63.8	23	237.9	17	44.0	10	360.7	20
Sheridan	All Routes							3.5	130	22.0	57	94.6	27	336.7	17	48.0	10	504.8	21
	Star Routes							1.0	63	5.4	49	109.2	24	187.1	14	81.3	5	384.0	16
	Rural Mail									2.5	70	15.4	57	56.0	29	56.2	7	130.1	23
Valley	All Routes							1.0	63	7.9	56	124.6	28	243.1	17	137.5	6	514.1	17
	Star Routes							32.0	72	82.1	39	282.6	23	754.1	15	204.1	3	1354.9	18
	Rural Mail									•2.7	97							•2.7	97
	" "							24.1	55	29.7	43	139.1	27	508.9	15	114.2	8	816.0	18
District #3	All Routes							56.1	65	114.5	41	421.7	24	1253.0	15	318.3	5	2173.6	18
	Star Routes									33.3	35	43.0	17	110.2	14	40.7	4	227.2	16
	Rural Mail									13.1	36	48.6	21	72.6	16	28.0	2	162.3	17
Dawson	All Routes									46.4	35	91.6	19	182.8	15	68.7	3	389.5	16

Table 45A (Continued)

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macedam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Ster Routes									45.8	27	30.0	29	284.1	11	8.1	3	368.0	14
	Rurel Mail									9.2	20	2.6	4	55.6	10	13.1	28	80.5	14
McCone	All Routes									55.0	26	32.6	26	339.7	11	21.2	1[illegible]	[illegible]	14
	Star Routes									28.7	26	36.6	15	101.6	8	6.6	2	173.5	12
	Rurel Mail																		
Prairie	All Routes									28.7	26	36.6	15	101.6	8	6.6	2	173.5	12
	Star Routes									10.7	33	3.2	10	194.1	13	7.5	5	215.5	14
	Rurel Mail									44.2	24	2.3	15	148.6	11	24.5	3	219.6	13
Richland	All Routes									54.9	26	5.5	12	342.7	13	32.0	3	435.1	14
	Star Routes							9.7	44	8.1	18	0.1	24	50.2	5	14.0	3	82.1	11
	Rurel Mail							2.0	2	16.7	33	2.4	4	39.8	6	10.3	3	71.2	12
Wibaux	All Routes							11.7	37	24.8	28	2.5	5	90.0	5	24.3	3	153.3	11
	Ster Routes							9.7	44	126.6	29	112.9	19	740.2	11	76.9	4	1066.3	14
	Rurel Mail							2.0	2	83.2	27	55.9	19	316.6	11	75.9	7	533.6	14
District #4	All Routes							11.7	37	209.8	28	168.8	19	1056.8	11	152.8	5	1599.9	14
	Star Routes							1.2	24	31.1	27	30.3	20	168.9	12	14.1	1	245.6	14
	Rural Mail							16.3	47	40.4	35	33.9	24	70.9	15	24.8	2	186.3	22
Fergus	All Routes							17.5	45	71.5	32	64.2	22	239.8	13	38.9	2	431.9	18
	Ster Routes									11.4	15			301.8	7	72.4	3	385.6	6
	Rurel Mail																		
Garfield	All Routes									11.4	15			301.8	7	72.4	3	385.6	6
	Star Routes									0.6	139	1.4	7	75.9	17	19.0	3	96.9	15
	Rural Mail																		
Petroleum	All Routes									0.6	139	1.4	7	75.9	17	19.0	3	96.9	15
	Star Routes							1.2	24	43.1	25	31.7	19	546.6	10	105.5	3	728.1	10
	Rural Mail							16.3	47	40.4	35	33.9	24	70.9	15	24.8	2	186.3	22
District #5	All Routes							17.5	45	83.5	30	65.6	22	617.5	11	130.3	3	914.4	13
	Star Routes							21.8	55	19.0	82	2.9	152	101.3	19	2.1	9	147.1	35
	Rurel Mail							8.4	16	37.8	34	13.5	50	121.0	16	9.3	8	190.0	20
Cascade	All Routes							30.2	44	56.8	50	16.4	52	222.3	17	11.4	8	337.1	26
	Star Routes													187.9	13	89.9	2	277.8	9
	Rural Mail									3.2	83			290.0	14	53.9	2	347.1	13
Chouteau	All Routes									3.2	63			477.9	14	143.8	2	624.9	11
	Ster Routes									22.7	32			1.5	7	0.5	10	24.7	30
	Rural Mail							11.6	14	99.1	22	30.9	9	56.8	8	47.6	4	246.0	13
Judith Basin	All Routes							11.6	14	121.8	24	30.9	9	58.3	8	48.1	4	270.7	15
	Star Routes											11.2	12	39.4	25	12.0	3	62.6	16
	Rural Mail									15.7	120	30.2	24	83.6	29	21.4	5	150.9	34
Pondera	All Routes									15.7	120	41.4	21	123.0	28	33.4	4	213.5	30
	Ster Routes									5.0	14	8.0	25	2.8	32	13.7	8	29.5	16
	Rural Mail									7.6	60	111.1	25	90.6	15	13.4	5	222.7	21
Teton	All Routes									12.6	42	119.1	25	93.4	16	27.1	7	252.2	20
	Ster Routes							21.8	55	46.7	50	22.1	35	332.9	16	118.2	3	541.7	18
	Rurel Mail							20.0	15	163.4	37	185.7	23	642.0	16	145.6	4	1156.7	18
District #6	All Routes							41.8	36	210.1	40	207.8	24	974.9	16	263.8	4	1698.4	18
	Ster Routes																		
	Rurel Mail							2.1	21	19.8	107	3.9	14	52.6	23	5.0	7	83.4	41
Broadwater	All Routes							2.1	21	19.8	107	3.9	14	52.6	23	5.0	7	83.4	41
	Star Routes									5.7	59			27.1	36	0.8	1	33.6	39
	Rural Mail							2.5	53	6.4	54			40.0	10	1.0	10	49.9	18
Jefferson	All Routes							2.5	53	12.1	56			67.1	21	1.8	6	83.5	27
	Ster Routes							7.2	41	28.5	34	8.9	54	62.7	25			107.3	31
	Rurel Mail							18.7	96	1.0	72	4.5	43	4.4	19			28.6	75
Lewis & Clark	All Routes							25.9	81	29.5	35	13.4	50	67.1	25			135.9	40
	Ster Routes							7.2	41	34.2	38	6.9	54	89.8	28	0.8	1	140.9	33
	Rurel Mail							23.3	84	27.2	93	8.4	30	97.0	17	6.0	8	161.9	40
District #7	All Routes							30.5	74	61.4	62	17.3	42	186.8	22	6.8	7	302.8	36

Tebla 45A (Continued)

County	Mail Route Clessification	Concrsta		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drainad		Unimprovad		Primitiva		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							2.4	32	1.5	1			30.3	18			34.2	18
	Rurel Mail																		
Granite	All Routes							2.4	32	1.5	1			30.3	18			34.2	18
	Star Routes							1.0	56	5.1	11			12.4	24			18.5	22
	Rurel Mail																	•1.7	505
	" "					•1.7	505	12.9	85	11.6	87			18.3	22	3.6	3	46.4	54
Missoula	All Routes					•1.7	505	13.9	83	16.7	64			30.7	23	3.6	3	66.6	57
	Star Routes													5.0	7	0.8	1	5.8	6
	Rural Mail							6.3	17	8.1	37	0.3	29	5.7	15			20.4	25
Powell	All Routes							6.3	17	8.1	37	0.3	29	10.7	11	0.8	1	26.2	20
	Star Routes							1.5	219	4.0	49			38.9	16	2.5	1	46.9	25
	Rural Mail									•6.3	123							•6.3	123
	" "																	•2.7	384
	" "					•2.7	384	11.2	152	36.6	60			129.1	30	2.0	3	178.9	43
Ravalli	All Routes					•2.7	384	12.7	160	46.9	68			168.0	27	4.5	2	234.8	46
	Star Routes									3.2	42			11.2	39			14.4	40
	Rural Mail									12.5	85			13.1	11			25.6	47
Sandere	All Routee									15.7	76			24.3	24			40.0	44
	Star Routes							4.9	94	13.8	28			97.8	20	3.3	1	119.8	23
	Rurel Mail									•6.3	123							•10.7	250
	" "					•4.4	431	30.4	96	68.8	66	0.3	29	166.2	27	5.6	3	271.3	44
District #8	All Routes					•4.4	431	35.3	96	88.9	64	0.3	29	264.0	24	8.9	2	401.8	43
	Star Routes							1.2	22					24.0	15	0.7	26	25.9	16
	Rural Mail									11.1	31	0.8	53	15.1	17			27.0	24
Beaverhead	All Routee							1.2	22	11.1	31	0.8	53	39.1	16	0.7	26	52.9	20
	Star Routes													12.1	24	4.8	1	16.9	17
	Rural Mail							12.6	51	1.0	23	2.8	27	8.7	14			25.1	34
Deer Lodge	All Routes							12.6	51	1.0	23	2.8	27	20.8	20	4.8	1	42.0	28
	Star Routes									18.2	45			69.0	24			87.2	28
	Rural Mail									9.7	45			36.2	18	3.0	6	48.9	23
Madison	All Routes									27.9	45			105.2	22	3.0	6	136.1	26
	Ster Routes																	•3.0	101
	" "					•3.0	101							0.4	57			0.4	57
	Rural Mail																	•5.8	174
	" "					•5.8	174	0.9	90					0.6	48			1.5	73
Silver Bow	All Routes					•8.8	149	0.9	90					1.0	52			10.7	135
	Star Routes																	•3.0	101
	" "					•3.0	101	1.2	22	18.2	45			105.5	22	5.5	4	131.6	24
	Rural Mail																	•5.8	174
	" "					•5.8	174	13.5	54	21.8	37	3.6	33	60.6	17	3.0	6	102.5	26
District #9	All Routee					•5.8	149	14.7	51	40.0	41	3.6	33	166.1	20	8.5	5	241.7	30
	Star Routes							4.4	75	8.3	57	0.5	27	18.9	16	8.8	5	40.9	28
	Rural Mail							36.4	60	65.5	59	17.8	25	105.1	23	0.9	10	225.7	40
Gallatin	All Routes							40.8	62	73.8	59	18.3	25	124.0	22	9.7	5	266.6	38
	Ster Routes							7.3	100	9.1	57			36.5	32			52.9	46
	Rural Mail									9.2	45	17.7	24	31.3	12	1.9	1	60.1	20
Park	All Routes							7.3	100	18.3	50	17.7	24	67.8	23	1.9	1	113.0	32
	Star Routes									30.5	70			106.6	16			137.1	28
	Rural Mail									0.9	10			15.7	8			16.6	8
Sweet Grass	All Routes									31.4	68			122.3	15			153.7	26
	Ster Routes									2.3	115			30.8	10	9.2	1	42.3	14
	Rural Mail																		
Meagher	All Routes									2.3	115			30.8	10	9.2	1	42.3	14
	Ster Routes							7.2	31	12.6	35	18.1	17	22.7	14	8.9	10	69.5	20
	Rural Mail																		
Wheatland	All Routes							7.2	31	12.6	35	18.1	17	22.7	14	8.9	10	69.5	20

Table 45A (Continued)

County	Mail Route Classification	Concrete		High Type Bituminous		Low Type Bituminous		Plain Macadam		Plain Gravel		Graded & Drained		Unimproved		Primitive		Total Mileage	
		Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
	Star Routes							18.9	68	62.8	61	18.6	17	215.5	18	26.9	5	342.7	28
	Rural Mail							36.4	60	75.6	57	35.5	25	152.1	19	2.8	4	302.4	34
District #10	All Routes							55.3	63	138.4	59	54.1	22	367.6	18	29.7	5	645.1	31
	Star Routes							19.0	134	61.7	49	1.5	11	71.3	11	1.6	2	155.1	41
	Rural Mail									4.2	21			31.5	16	4.3	3	40.0	15
Big Horn	All Routes							19.0	134	65.9	47	1.5	11	102.8	13	5.9	3	195.1	36
	Star Routes							8.8	28	21.4	33	11.5	18	63.7	28	7.8	2	113.2	26
	Rural Mail									7.3	51	0.5	6	62.3	27			70.1	29
Carbon	All Routes							8.8	28	28.7	38	12.0	18	126.0	28	7.8	2	183.3	27
	Star Routes									15.0	30	1.2	18	85.4	6	21.6	2	123.2	8
	Rural Mail									4.6	34	3.9	27	31.8	11	0.6	10	40.9	15
Golden Valley	All Routes									19.6	31	5.1	25	117.2	7	22.2	2	164.1	10
	Star Routes							0.5	34	10.3	10	9.3	18	130.3	14	30.5	2	180.9	12
	Rural Mail																		
Musselshell	All Routes							0.5	34	10.3	10	9.3	18	130.3	14	30.5	2	180.9	12
	Star Routes							5.8	103	2.8	77			185.4	15	7.4	2	201.4	18
	Rural Mail							0.5	29			3.4	20	106.5	12	0.6	13	111.0	12
Stillwater	All Routes							6.3	97	2.8	77	3.4	20	291.9	14	8.0	3	312.4	16
	Star Routes									30.6	23	2.2	38	41.7	8			74.5	15
	Rural Mail																		
Treasure	All Routes									30.6	23	2.2	38	41.7	8			74.5	15
	Star Routes																	•2.3	208
	" "					•2.3	208	6.7	70	36.2	41	6.8	56	157.4	11	3.6	2	210.7	19
	Rural Mail																	•12.9	162
	" "					•12.9	162	59.4	36	86.4	31	2.0	11	68.2	10	17.2	13	233.2	25
Yellowstone	All Routes					•15.2	169	66.1	39	122.6	34	8.8	46	225.6	11	20.8	11	459.1	27
	Star Routes																	•2.3	208
	" "					•2.3	208	40.8	95	176.0	38	32.5	27	735.2	13	72.5	2	1059.0	20
	Rural Mail																	•12.9	162
	" "					•12.9	162	59.9	36	102.5	32	9.8	20	300.3	15	22.7	11	495.2	21
District #11	All Routes					•15.2	169	100.7	60	280.5	36	42.3	25	1035.5	14	95.2	4	1569.4	22
	Star Routes							7.1	70	3.1	37			239.7	20	25.8	2	275.7	20
	Rural Mail																		
Carter	All Routes							7.1	70	3.1	37			239.7	20	25.8	2	275.7	20
	Star Routes									58.4	24	49.3	20	128.6	18	1.4	5	237.7	20
	Rural Mail																		
Custer	All Routes									58.4	24	49.3	20	128.6	18	1.4	5	237.7	20
	Star Routes									45.5	35	14.4	19	157.4	9	2.1	4	219.4	15
	Rural Mail													12.2	4	1.0	2	13.2	4
Fallon	All Routes									45.5	35	14.4	19	169.6	9	3.1	3	232.6	14
	Star Routes									36.2	14			249.5	11	34.2	1	319.9	10
	Rural Mail																		
Powder River	All Routes									36.2	14			249.5	11	34.2	1	319.9	10
	Star Routes							10.7	19	26.5	23			181.2	13	13.9	1	232.3	14
	Rural Mail																		
Rosebud	All Routes							10.7	19	26.5	23			181.2	13	13.9	1	232.3	14
	Star Routes							17.8	39	169.4	25	63.7	20	956.4	14	77.4	1	1285.0	15
	Rural Mail													12.2	4	1.0	2	13.2	4
District #12	All Routes							17.8	39	169.7	25	63.7	20	968.6	14	78.4	2	1298.2	15
Improved to	Star Routes					•9.2	103											•9.2	103
Acceptable	Rural Mail					•23.1	216			•9.0	115							•32.1	188
Standards	All Routes					•32.3	184			•9.0	115							•41.3	169
Not Improved	Star Routes							181.4	67	862.9	37	871.6	27	5204.3	14	801.3	3	7921.5	18
to Acceptable	Rural Mail							282.3	59	733.5	43	519.3	24	2791.8	17	580.1	5	4907.0	23
Standards	All Routes							463.7	62	1596.4	40	1390.9	26	7996.1	15	1381.4	4	12328.5	20
	Star Routes					•9.2	103	181.4	67	862.9	37	871.6	27	5204.3	14	801.3	3	7930.7	13
	Rural Mail					•23.1	216	282.3	59	742.5	44	519.3	24	2791.8	17	580.1	5	4939.1	24
Statewide	All Routes					•32.3	184	463.7	62	1605.4	40	1390.9	26	7996.1	15	1381.4	4	12869.8	20

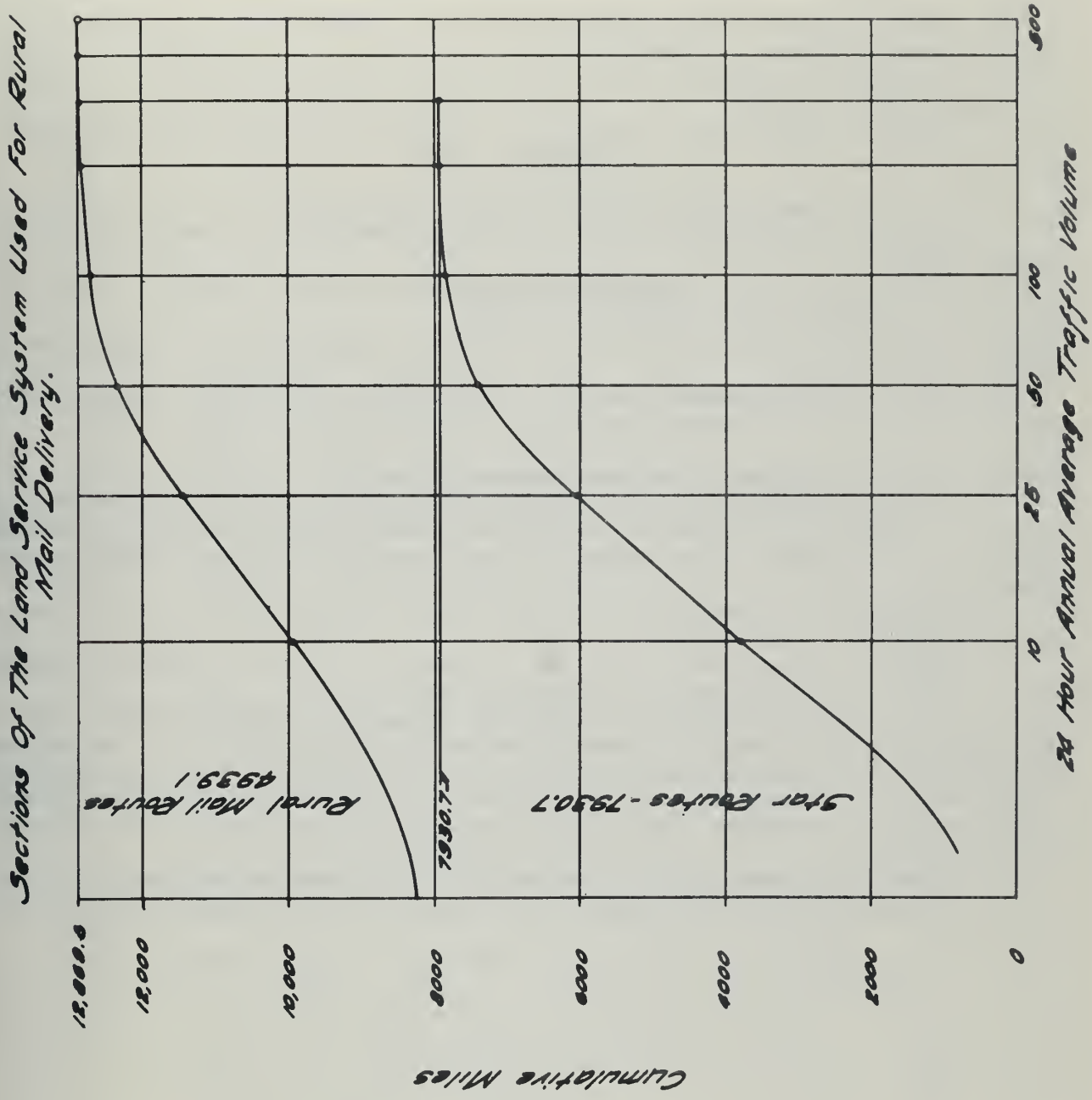
Table 45B

TRAFFIC DENSITY CLASSIFICATION OF THOSE SECTIONS OF THE LAND SERVICE SYSTEM USED FOR RURAL POSTAL DELIVERIES

* Improved to acceptable standards

Surface Type	Mail Route Classification	Traffic Volume Groups								Total Length	Average Traffic
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499		
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi	Mi.	
*Low Type	Star Routes		1.3	1.4	2.3	2.9	1.3			9.2	103
Bituminous	Rural Routes		1.3	1.0	1.7	9.1	5.0	1.9	3.1	23.1	216
	All Routes		2.6	2.4	4.0	12.0	6.3	1.9	3.1	32.3	184
	Star Routes										
*Plain	Rural Routes				1.6	7.4				9.0	115
Gravel	All Routes				1.6	7.4				9.0	115
	Star Routes	7.3	10.0	87.5	36.9	37.9	1.8			181.4	67
Plain	Rural Routes	14.8	74.3	71.6	61.6	57.4	2.2	0.2	0.2	282.3	59
Macadam	All Routes	22.1	84.3	159.1	98.5	95.3	4.0	0.2	0.2	463.7	62
	Star Routes	103.6	279.7	280.3	174.6	23.8	0.9			862.9	37
Plain	Rural Routes	78.5	229.9	229.0	143.3	46.0	4.9	1.9		733.5	43
Gravel	All Routes	182.1	509.6	509.3	317.9	69.8	5.8	1.9		1596.4	40
	Star Routes	187.7	370.8	204.0	93.1	11.3	4.7			871.6	27
Graded &	Rural Routes	153.1	162.6	159.1	37.6	6.6	0.3			519.3	24
Drained	All Routes	340.8	533.4	363.1	130.7	17.9	5.0			1390.9	26
	Star Routes	2731.1	1548.6	791.9	119.8	12.9				5204.3	14
	Rural Routes	1248.7	982.1	456.8	79.8	24.1	0.2	0.1		2791.8	17
Unimproved	All Routes	3979.8	2530.7	1248.7	199.6	37.0	0.2	0.1		7996.1	15
	Star Routes	773.1	24.6	3.4	0.2					801.3	3
	Rural Routes	537.2	23.4	11.8	7.7					580.1	5
Primitive	All Routes	1310.3	48.0	15.2	7.9					1381.4	4
All	Star Routes		1.3	1.4	2.3	2.9	1.3			9.2	103
Improved	Rural Routes		1.3	1.0	3.3	16.5	5.0	1.9	3.1	32.1	188
Types	All Routes		2.6	2.4	5.6	19.4	6.3	1.9	3.1	41.3	169
All	Star Routes	3802.8	2233.7	1367.1	424.6	85.9	7.4			7921.5	18
Unimproved	Rural Routes	2032.3	1472.3	928.3	330.0	134.1	7.6	2.2	0.2	4907.0	23
Types	All Routes	5835.1	3706.0	2295.4	754.6	220.0	15.0	2.2	0.2	12828.5	20
	Star Routes	3802.8	2235.0	1368.5	426.9	88.8	8.7			7930.7	18
	Rural Routes	2032.3	1473.6	929.3	333.3	150.6	12.6	4.1	3.3	4939.1	24
Statewide	All Routes	5835.1	3708.6	2297.8	760.2	239.4	21.3	4.1	3.3	12869.8	20

Resolving these data into a graphical presentation we have results as follows:



Significant data deriving from the tabulation and the graph are as follows:

1. Star Routes

a. Traffic volumesare in excess of those maintained over the Land Service System as a whole.

b. Traffic volumes range generally within the same limits in evidence over the Land Service System as a whole.

c. The greatest mileage falls in the traffic volume group 0-9 as it does for the system as a whole.

d. Half the mileage bears less than 11 vehicles per mile per day as opposed to a median figure of 6 on the Land Service System as a whole.

2. Rural Mail Routes

a. Traffic volumes are in excess of those manifest over the Land Service System as a whole.

b. The traffic volumes range generally within the same limits as those set forth over the Land Service System as a whole.

c. The greatest mileage falls in the traffic volume group 0-9 as it does on the system as a whole.

d. Half the mileage bears less than 14 vehicles as opposed to a median figure of 6 on the system as a whole.

3. All Rural Post Roads on the Land Service System

a. Traffic volumes are in excess of those in evidence over the Land Service System as a whole, there being no exceptions in any of the surface type categories.

b. Traffic volumes range within the same limits as those set forth for the system.

c. The greatest mileage falls in the traffic volume group 0-9, as it does on the Land Service System as a whole.

d. Half the mileage bears less than 12 vehicles per day as opposed to a median figure of 6 over the Land Service System as a whole.

e. Rural postal deliveries are afforded an improved dustless surface over a length of 32.3 miles, and an improved surfaced mileage of 41.3 miles, the balance of the mileage (12,828.5 miles) exists in a non-uniform state and not acceptable under present day standards. Of the mileage in the latter classification, 2,060.1 miles are gravel surfaced, 1,390.9 miles are graded and drained, and the balance, 9,377.5 miles, exists in an unimproved or primitive state.

f. Generally speaking, those sections of Land Service System used for rural postal deliveries denote the mileage in the higher traffic volume categories.

CHAPTER IV

INDICES AND TRENDS OF TRAFFIC GROWTH AND ESTIMATE OF TRAFFIC INCREASE BY 1950

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IV
INDICES AND TRENDS OF TRAFFIC GROWTH AND ESTIMATE OF GENERAL TRAFFIC INCREASE BY 1950

To all outward appearances, Montana has reached a fairly static stage in its economic development. It is entirely probable that the state has passed through its period of maximum or extreme rate of development. Any changes affecting the present relationship of motor vehicle ownership, motor vehicle taxation levels and the established roadway systems will come as a result of stabilization of our present industries. As an example, it is probable that our present program of water conservation, with the possibility thus afforded of irrigation, will provide a more constant source of wealth in our rural areas. Continuing, it is probable that crops will be diversified, the trend being toward smaller units with a resultant increase in motor vehicle ownership. A cycle of years such as that experienced before the 1920's would do much to restore the eastern ranges of the state with beneficial results in matters of individual wealth. Ignoring for the moment the possibilities affecting our future economic stature, we may, on the basis of past motor vehicle ownership and use, estimate the probable degree of ownership and use as follows:

4.01 Past Record of Annual Motor Vehicle Registration

According to data deriving from the records of the State Board of Equalization, the motor vehicle registration increased from the year 1910 as shown by Plate XIV. Prior to 1925 the data originates with the Third Biennial Report of the State Highway Commission 1921-1922.

Study of the Plate reveals the growth of registration to be coincident in part with the period of rapid development in the State. During the period covered, truck and bus registrations increased three fold, while passenger car registrations increased only by 62%.

4.02 Population Increases and The Trend Thereof

During the period under study, population increased in accord with motor vehicle registration until the year 1921. Subsequent to 1921 the population decreased as a consequence of business depression and a cycle of dry years in the eastern part of the state. Beginning with the year 1937, a slight upturn is in evidence which we trust is indicative somewhat of future population trends in the state. Further study of the data reveals a slow rate of growth during the years 1890-1905 during which time the state was developing its several industries. During the next sixteen years (1906-1921) the public domain was thrown open to homestead entry with a resultant influx of immigration devoted to raising cash grain. In other words, the agricultural economic structure was changed from one of large holdings to one of smaller unit holdings. During the period there was adequate rainfall and, as a consequence of war conditions in Europe, there was a ready market for all commodities, hence the state gave promise of developing into a veritable agricultural paradise and immigration along with natural growth raised the population from 325,000 in 1906 to 584,000 in 1921, an increase of 259,000 or 17,250 per year. Following 1921 and the end of the World War, the state entered upon a cycle of dry years and as a consequence of emigration there was an almost constant, though small, annual decrease in population. It might be said that the state is coming to rest in matters of development, hence during the last period we might say that we are approaching a "ceiling" of agricultural and industrial development and population growth will conform to that in evidence throughout the nation. As a means of forecasting

PLATE XIV

Showing Growth Of Motor Vehicle Registration In Montana And Trends Therefor

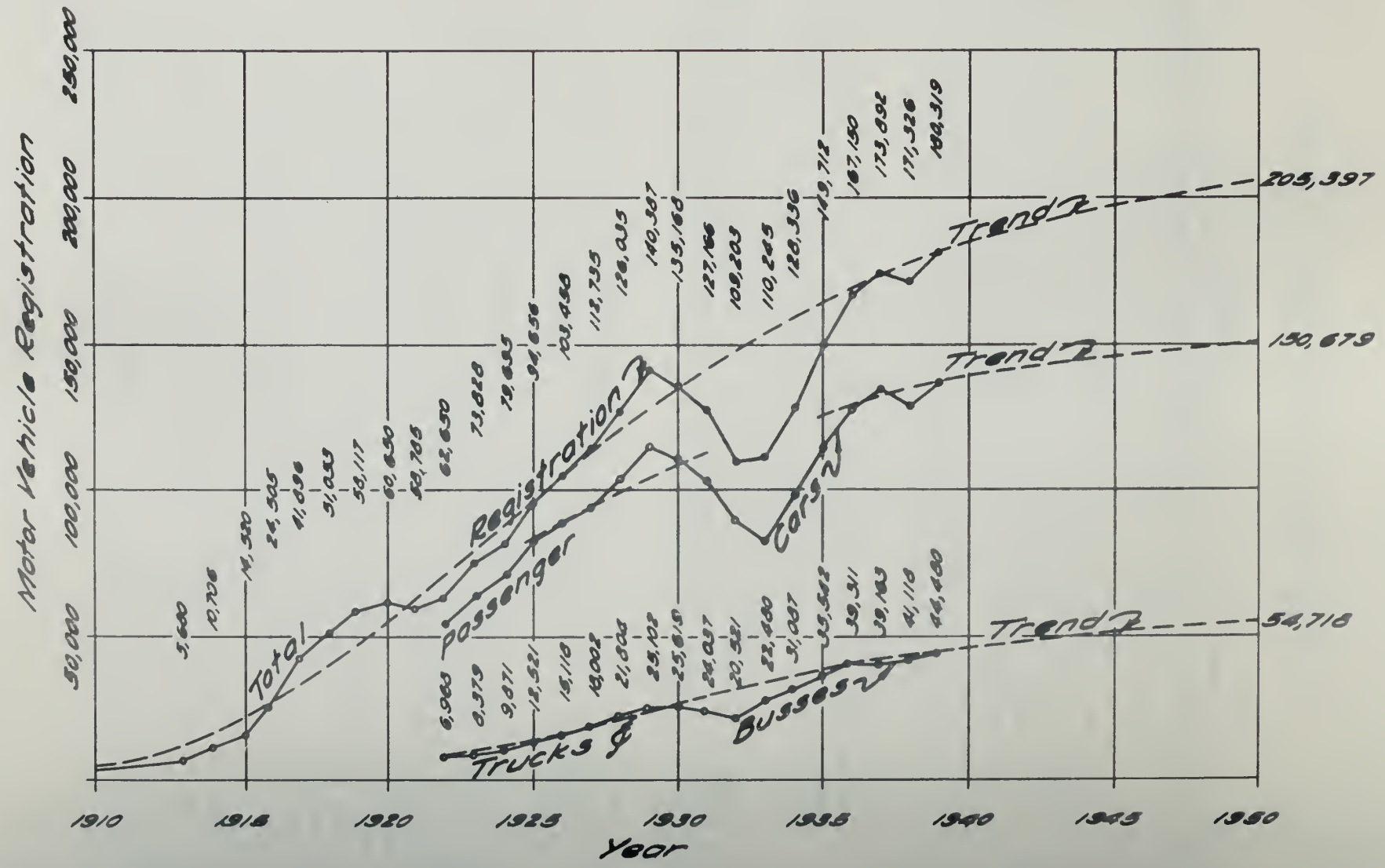
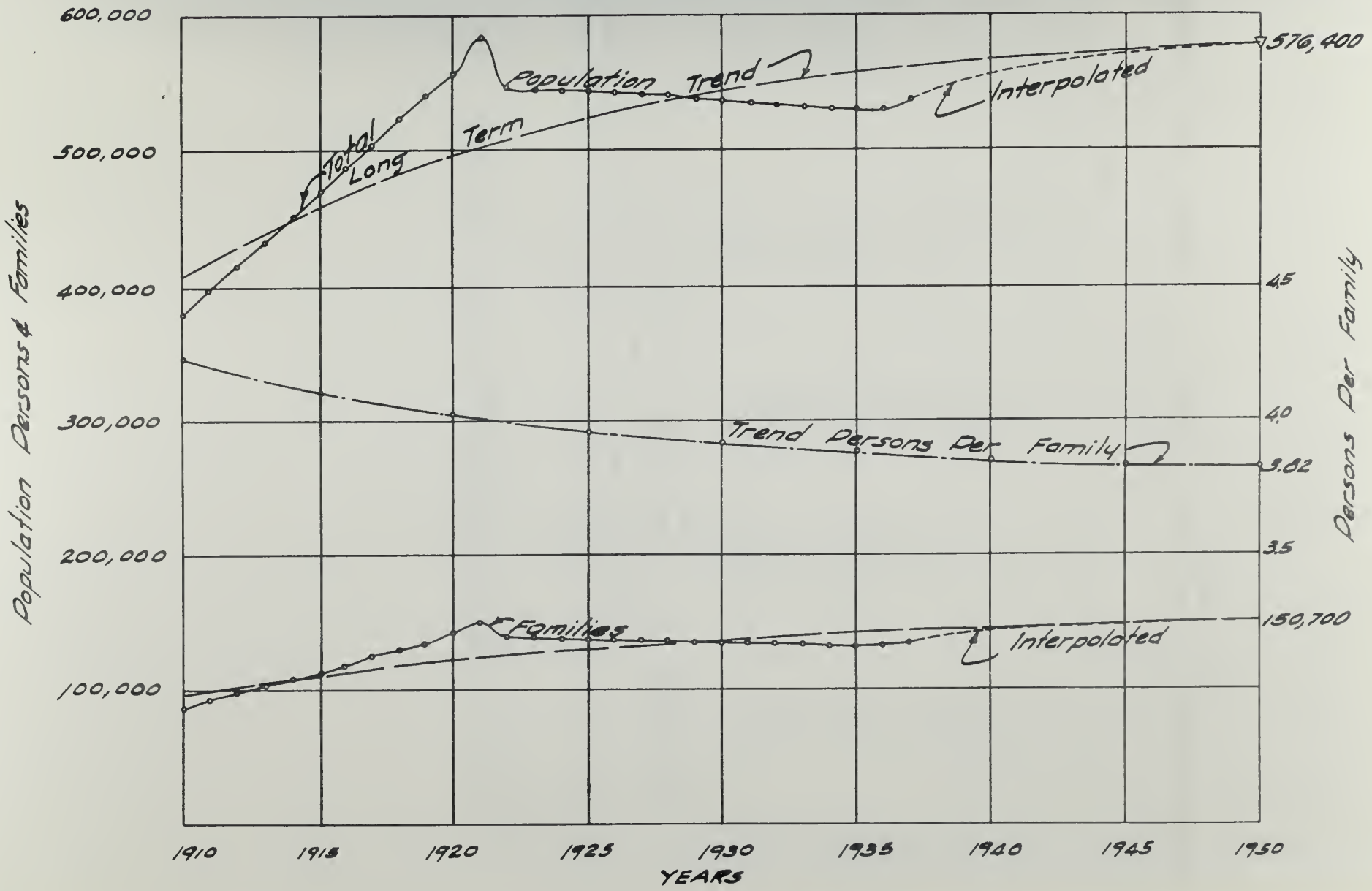


PLATE XV

Population Growth In Montana By Persons And Families And Long Term Trends



the future population, this department has availed itself of a curve devised to represent a normal business development, rising slowly at first then faster, then levelling off as the peak of development is reached. Plate XV (page 4-3) depicts the growth of population in the state, both by persons and families along with the calculated curve illustrating the trend.

The trends are somewhat above actualities as of the year 1937, however, on projection to 1950 we have results which appear entirely reasonable. By connecting the 1937 data with the projected data we may render an estimate of growth as follows:

Year	Persons		Persons Per Family	Families	
	Trend Value	Interpolated Value	Trend Value	Trend Value	Interpolated Value
1937	560,300	539,000	3.8748	144,600	139,100
1938	562,100	544,500	3.8712	145,200	140,700
1939	563,800	549,600	3.8643	145,900	142,200
1940	565,500	554,300	3.8601	146,500	143,600
1941	567,000	558,500	3.8545	147,100	144,900
1942	568,300	562,200	3.8503	147,600	146,000
1943	569,600	565,600	3.8460	148,100	147,100
1944	570,800	568,400	3.8438	148,500	147,900
1945	572,000	570,900	3.8389	149,000	148,700
1946	573,000	572,900	3.8353	149,400	149,400
1947	573,900	574,400	3.8337	149,700	149,800
1948	574,800	575,500	3.8294	150,100	150,300
1949	575,600	576,200	3.8271	150,400	150,600
1950	576,400	576,400	3.8248	150,700	150,700

4.03 Trends in Motor Vehicle Registration

As set forth in Section 4.01 we find, generally speaking, that our motor vehicle registration has increased in accord with growth indices evident in the population growth curve. Applying the same equation as that used in the preparation of the population growth curve[1/] ($\log y = \log a + c^x \log b$) we are enabled to present an estimate of motor vehicle registration growth as follows:

1/ This curve is commonly called the Gompertz curve and its use and derivation is explained in most texts treating with statistics.

Year	Passenger Cars		Trucks & Buses		All Vehicles	
	As Recorded in Past	Trend in Registration	As Recorded in Past	Trend in Registration	As Recorded in Past	Trend in Registration
1915	13,213*	18,655	1,307*	1,645	14,520	20,300
1920	54,828*	49,720	5,822*	5,280	60,650	55,000
1922	55,682*	63,429	6,968*	7,048	62,650	70,477
1923	65,449	70,119	8,379	8,844	73,828	78,963
1924	69,824	76,606	9,671	10,844	79,495	87,450
1925	82,135	82,859	12,521	13,047	94,656	95,938
1926	88,840	88,707	15,118	15,409	103,958	104,116
1927	94,733	94,200	18,002	17,943	112,735	112,143
1928	104,231	99,378	21,804	20,644	126,035	120,022
1929	115,285	103,797	25,102	23,405	140,387	127,202
1930	109,549	107,958	25,619	26,318	135,168	134,276
1931	103,129	111,864	24,037	29,379	127,166	141,243
1932	88,611	115,316	20,521	31,959	109,203	147,275
1933	82,765	119,018	27,480	34,159	110,245	153,177
1934	97,249	122,805	31,087	36,145	128,336	158,950
1935	114,170	125,968	35,542	37,860	149,712	163,828
1936	127,839	128,996	39,311	39,582	167,150	168,578
1937	133,811	131,874	39,163	41,326	173,892	173,200
1938	130,208	134,189	41,118	42,841	171,326	177,030
1939	135,839	136,463	44,480	44,282	180,319	180,745
1940		138,812		45,533		184,345
1941		140,512		46,766		187,288
1942		142,432		47,883		190,135
1943		144,010		48,877		192,887
1944		145,301		49,813		195,114
1945		146,547		50,717		197,264
1946		147,709		51,628		199,337
1947		148,582		52,422		201,004
1948		149,385		53,226		202,611
1949		150,159		54,000		204,159
1950		150,679		54,718		205,397

* Estimated since there was no differentiation in the registrar's office between passenger cars and trucks and buses prior to 1922.

These data are shown graphically on Plate XIV.

By comparing the actual registration and the total population and the trends for each of these factors, we find the estimated distribution of motor vehicles to be as follows:

Year	Past Record of Population & Motor Vehicle Registration							Estimate of Population and Motor Vehicle Registration According to Trends						
	Total Population	Passenger Cars	Persons Per Passenger Car	Trucks & Buses	Persons Per Truck or Bus	All Vehicles	Persons Per Motor Vehicle	Total Population	Passenger Cars	Persons Per Passenger Car	Trucks & Buses	Persons Per Truck or Bus	All Vehicles	Persons Per Motor Vehicle
1915	469,000	13,213*	28.17	1,307*	358.84	14,520	32.30	459,000	18,655	24.60	1,845	248.78	20,500	22.39
1916	487,000	22,270*	21.87	2,235*	217.90	24,505	19.87	467,500	22,270	20.99	2,235	209.17	24,505	19.08
1917	504,000	38,024*	13.26	3,872*	130.16	41,896	12.03	475,400	29,500	16.12	3,000	158.47	32,500	14.63
1918	522,000	46,273*	11.28	4,780*	109.21	51,053	10.22	482,900	35,350	13.66	3,650	132.30	39,000	12.38
1919	540,000	52,607*	10.26	5,510*	98.00	59,117	9.13	489,800	42,090	11.64	4,410	111.07	46,500	10.53
1920	557,000	54,828*	10.16	5,822*	95.67	60,650	9.18	496,000	49,720	9.96	5,280	93.94	55,000	9.02
1921	584,000	53,070*	11.00	5,715*	102.19	58,785	9.93	502,500	54,175	9.28	6,025	83.40	60,200	8.35
1922	546,000	55,682	9.81	6,968	76.36	62,650	8.71	508,300	63,429	8.01	7,048	72.12	70,477	7.21
1923	545,000	65,449	8.33	8,379	65.04	73,828	7.38	513,700	70,119	7.33	8,844	58.00	78,963	6.51
1924	544,000	69,824	7.79	9,871	55.11	79,695	6.83	518,700	76,606	6.77	10,844	47.83	87,450	5.93
1925	543,000	82,135	6.61	12,521	43.37	94,656	5.74	523,000	82,889	6.31	13,047	40.09	95,936	5.45
1926	542,000	88,840	6.10	15,118	35.85	103,958	5.21	527,600	88,707	5.95	15,409	34.25	104,116	5.07
1927	541,000	94,733	5.71	18,002	30.05	112,735	4.80	531,900	94,200	5.65	17,943	29.64	112,143	4.74
1928	540,000	104,231	5.18	21,804	24.77	126,035	4.28	535,700	99,378	5.39	20,644	25.95	120,022	4.46
1929	538,000	115,285	4.67	25,102	21.43	140,387	3.83	539,300	103,797	5.20	23,405	23.04	127,202	4.24
1930	537,000	109,549	4.90	25,619	20.96	135,168	3.97	543,000	107,958	5.03	26,318	20.63	134,276	4.04
1931	536,000	103,129	5.20	24,037	22.30	127,166	4.21	545,700	111,864	4.88	29,379	18.57	141,243	3.86
1932	535,000	86,611	6.04	20,521	26.07	109,203	4.90	548,600	115,316	4.76	31,959	17.17	147,275	3.73
1933	533,000	82,765	6.44	27,480	19.40	110,245	4.83	551,300	119,018	4.63	34,159	16.14	153,177	3.60
1934	531,000	97,249	5 46	31,087	17 08	128,336	4.14	553,800	122,805	4.51	36,145	15.32	158,950	3.48
1935	531,000	114,170	4.65	35,542	14.94	149,712	3.55	556,100	125,968	4.41	37,860	14.69	163,828	3.39
1936	531,000	127,839	4.15	39,311	13.51	167,150	3.18	558,300	128,996	4.33	39,582	14.10	168,578	3.31
1937	539,000	133,811	4.03	39,163	13.76	173,892	3.10	560,300	131,874	4.25	41,326	13.56	173,200	3.23
1938	544,500	130,208	4.18	41,118	13.24	171,326	3.18	562,100	134,189	4.19	42,841	13.12	177,030	3.18
1939	549,600	135,839	4.05	44,480	12.36	180,319	3.05	563,800	136,463	4.13	44,282	12.73	180,745	3.12
1940								565,500	138,812	4.07	45,533	12.42	184,345	3.07
1941								567,000	140,522	4.03	46,766	12.12	187,288	3.03
1942								568,300	142,432	3.99	47,883	11.87	190,135	2.99
1943								569,600	144,010	3.95	48,877	11.65	192,887	2.95
1944								570,800	145,301	3.93	49,813	11.46	195,114	2.92
1945								572,000	146,547	3.90	50,717	11.28	197,264	2.89
1946								573,000	147,709	3.88	51,628	11.10	199,337	2.87
1947								573,900	148,582	3.86	52,422	10.95	201,004	2.85
1948								574,800	149,385	3.85	53,226	10.80	202,611	2.83
1949								575,600	150,159	3.83	54,000	10.66	204,159	2.82
1950								576,400	150,679	3.82	54,718	10.53	205,397	2.81

*Estimated since there was no differentiation in the registrar's office between passenger cars and trucks and buses prior to 1922.

According to the trends manifest in the tabulations it is estimated that there will be 205,397 vehicles registered in the State in 1950, there being 2.81 persons per vehicle at that time.

The data are set forth graphically on Plate XVI as shown on page 4-7.

4.04 Tentative Estimate of Future Gasoline Consumption

The past relation of taxed gasoline consumption with respect to motor vehicle registration should furnish some index of the future. There are, however, several factors which govern any prediction on this basis, these being:

(1) Increased driving per vehicle per year up to a point governed by the ability of the populace to pay and the time made available to drive.

(2) There is evidence of increased commercial vehicle registration, these units being larger require more fuel, hence there should be increased revenue.

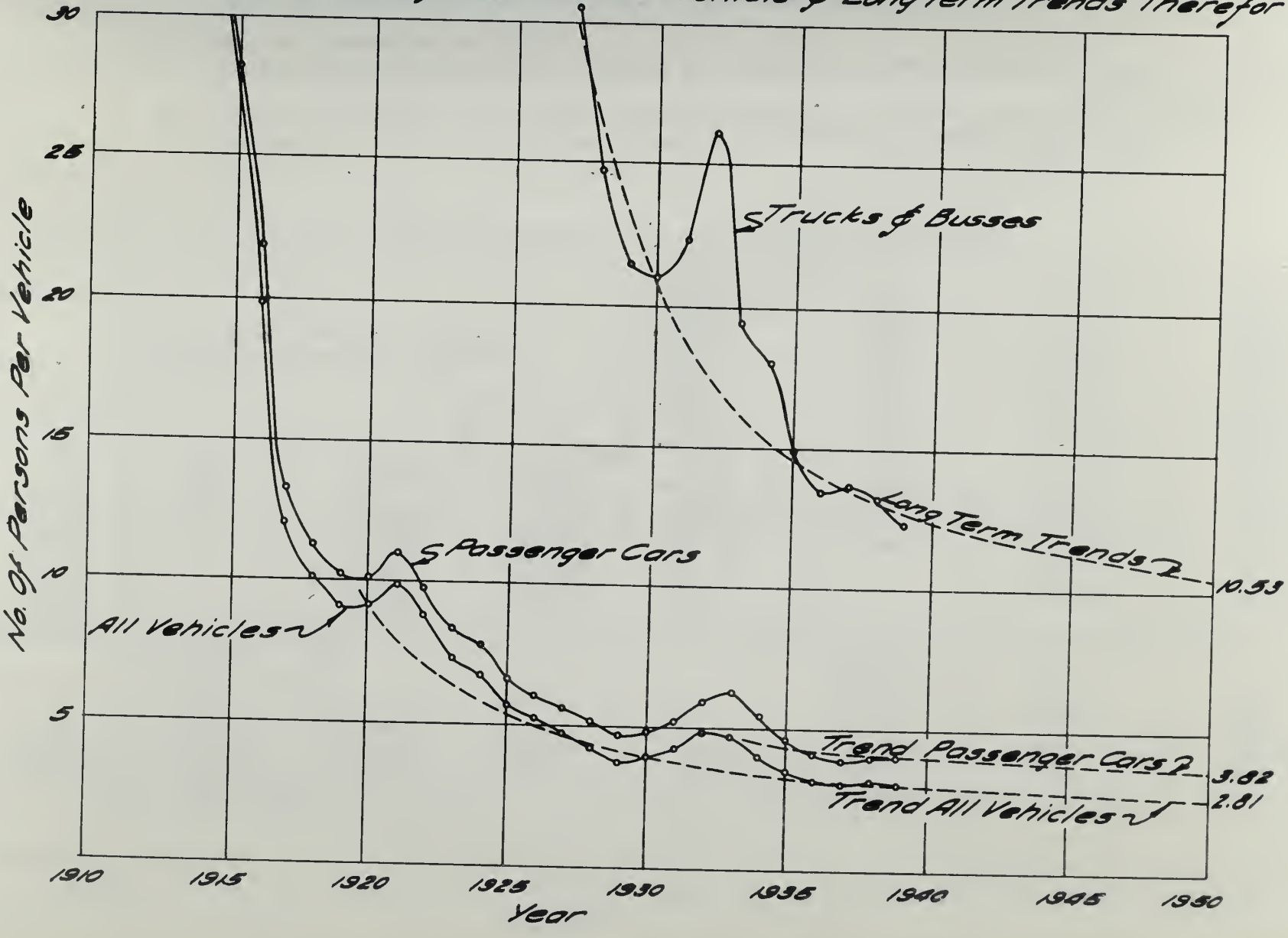
(3) Foreign traffic makes up a considerable portion of the whole and tends to increase each year with a resultant increase in equivalent registration.

(4) Efficiency of motor vehicles is constantly increasing with the effect of increasing the mileage per gallon of gasoline.

The use and consideration of these several factors in an equation directed toward a forecast of future gasoline consumption introduces a number of variables. Further, we have no great knowledge as to the average mileage per gallon of gasoline in the past, for example: we know that the average passengar car went 16.6 miles per gallon of gasoline in 1936 but what was the mileage in 1930 or 1935. The use of these data would tend to cloud the issue since they are founded on supposition as regards gas mileage, increased foreign traffic, etc. for the years other than 1936. Let us then avail ourselves of a statistical growth curve ($\log y = \log a + c^x \log b$) and apply it to the past record of gasoline consumption represented in the gasoline license tax receipts. By so doing we assume that the several factors listed herebefore are given a proper weight in the growth curve and the results of the computation are set forth on page 4-8.

PLATE XVI

Showing Number of Persons Per Vehicle & Long Term Trends Therefor



Year	Past Record of Gasoline Consumption in Gallons				The Trend in Gasoline Consumption in Gallons			
	Gallonage Represented in Deductions 1/	Gallonage Representing Consumption by Vehicles Owned by Cities and Counties & Refunded After 1936	Gallonage Representing Net Receipts to Highway Fund	Total Gasoline Consumption by all Motor Vehicles	Gallonage Represented in Deductions	Gallonage Representing Consumption by Vehicles Owned by City and County Agencies & Refunded After 1936	Gallonage Used in Computation of Net Receipts to Highway Fund	Total Gasoline Consumption by all Motor Vehicles
1930	457,000		58,397,000	58,854,000				
1931	543,000		59,820,000	60,363,000	463,000		51,007,000	51,470,000
1932	632,000		53,171,000	53,803,000	554,000		57,782,000	58,336,000
1933	630,000		54,396,000	55,026,000	643,000		64,375,000	65,018,000
1934	740,000		71,181,000	71,921,000	728,000		70,690,000	71,418,000
1935	756,000		76,135,000	76,891,000	809,000		76,650,000	77,459,000
1936	675,000		88,430,000	89,105,000	884,000		82,098,000	82,982,000
1937	934,000	506,000	90,684,000	92,124,000	953,000	529,000	86,508,000	87,990,000
1938	815,000	526,000	88,219,000	89,560,000	1,017,000	547,000	90,745,000	92,309,000
1939	1,075,000	566,000	94,932,000	96,573,000	1,075,000	565,000	94,911,000	96,551,000
1940					1,127,000	580,000	98,751,000	100,458,000
1941					1,174,000	595,000	102,193,000	103,962,000
1942					1,216,000	608,000	105,263,000	107,087,000
1943					1,253,000	620,000	107,988,000	109,861,000
1944					1,286,000	631,000	110,404,000	112,321,000
1945					1,315,000	642,000	112,533,000	114,490,000
1946					1,341,000	652,000	114,403,000	116,396,000
1947					1,363,000	662,000	116,045,000	118,070,000
1948					1,383,000	672,000	117,478,000	119,533,000
1949					1,400,000	681,000	118,730,000	120,811,000
1950					1,408,000	688,000	119,831,000	121,927,000

1/ Representing the gallonage required to offset costs of collection of the Board of Equalization and administrative costs incident to collection of the gas tax revenue in the Department of Agriculture, the office of the State Auditor and the Purchasing Department.

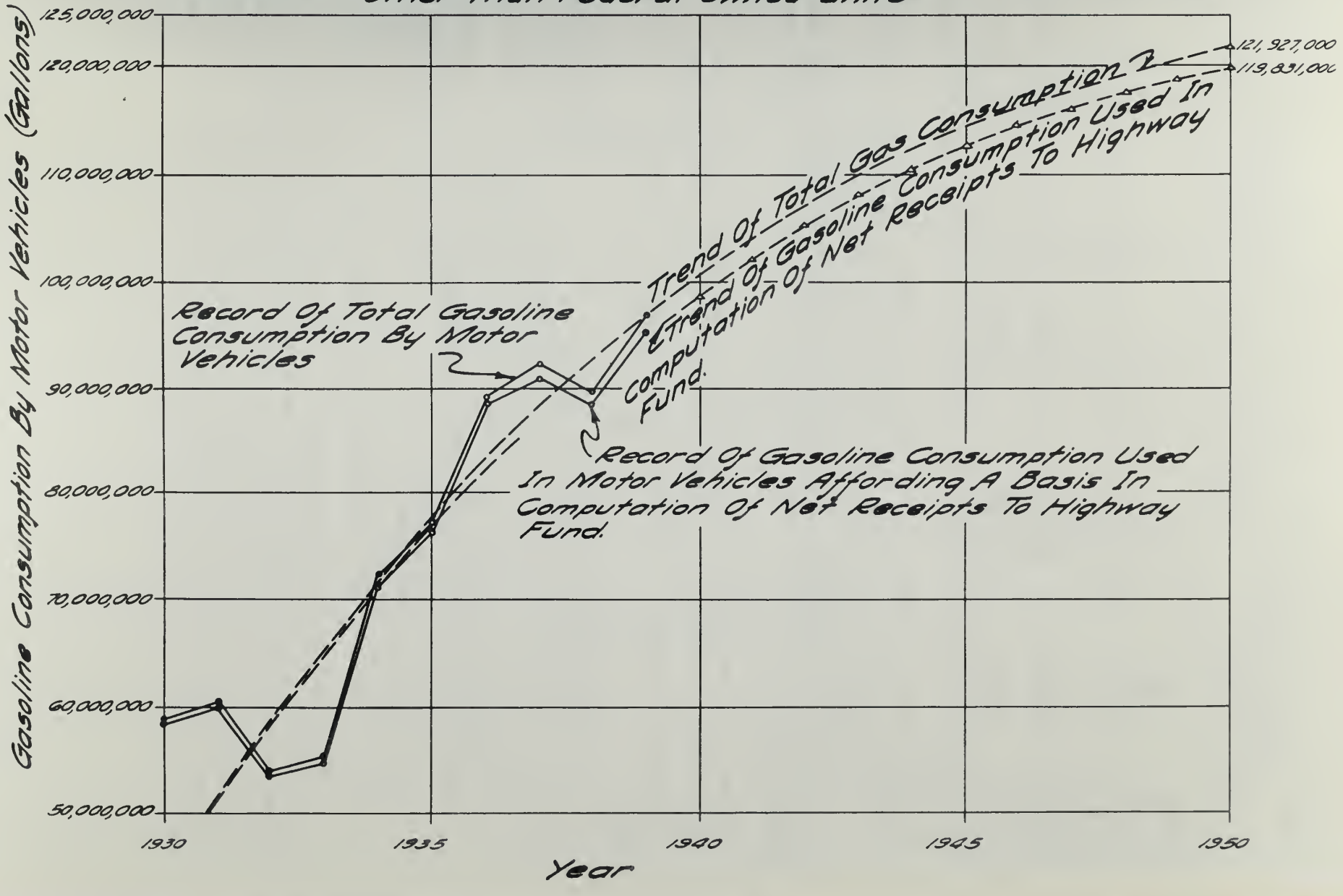
The quantities in the tabulation represent an estimate of gasoline consumption by all motor vehicles on the highways with the exception of Federal owned units.

According to the trend we may expect a net revenue of almost $6,000,000 from the gasoline license tax in 1950.

These data are presented graphically on Plate XVII on page 4-9.

PLATE XVII

Showing Gasoline Consumption In Montana By All Motor Vehicles Other Than Federal Owned Units



4.041 Estimate of Future Gasoline Consumption Classified by Vehicle Types.

While it has been said previously that we lack data concerning the amount of foreign traffic, the average mileage per gallon of gasoline etc., we do have some knowledge concerning these factors as of the year 1936. In that year we find from the Motor Vehicle Allocation Survey significant data as follows:

(1) 126,660 passenger cars owned and registered in Montana consumed 52,808,000 gallons of gasoline. On the average each passenger car thus consumed 416.93 gallons of gasoline.

(2) 38,644 trucks and buses owned and registered in Montana consumed 26,816,000 gallons of gasoline. On the average each truck or bus consumed 693.91 gallons of gasoline.

(3) 139 state owned passenger cars consumed 282,000 gallons of gasoline.

(4) 457 state owned trucks consumed 945,000 gallons of gasoline.

(5) 96 passenger cars owned by county and city agencies consumed 71,000 gallons of gasoline.

(6) 604 trucks owned by county and city agencies consumed 434,000 gallons of gasoline.

(7) Foreign passenger cars consumed 8,640,000 gallons of gasoline.

(8) Foreign trucks and buses consumed 877,000 gallons of gasoline.

(9) The total gasoline consumed by all vehicles other than Federal owned units on the roads, streets and highways in Montana for the year 1936 was estimated to be 90,873,000 gallons.

Subsequent reports having the benefit of "hindsight" would indicate that the total gasoline consumption by all motor vehicles was 89,105,000 gallons.

Reducing the data in accord with the proportion in evidence we have results as follows:

(1)	Passenger cars owned in the state -	51,780,000 gallons
(2)	Trucks and buses owned in this state -	26,293,000 "
(3)	Passenger cars owned by state governmental depts. -	277,000 "
(4)	Trucks " " " " "	927,000 "
(5)	Passenger cars owned by county and city governmental departments and agencies -	70,000 "
(6)	Trucks owned by county and city governmental departments and agencies -	426,000 "
(7)	Foreign passenger cars -	8,472,000 "
(8)	Foreign trucks and buses -	860,000 "
(9)	All motor vehicles other than Federal owned units -	89,105,000 "

Previous estimates set forth herein concerning the total registration in the state included vehicles registered and owned in this state and vehicles registered in Montana and owned in other states. In 1936 we find a total of 127,839 passenger cars and 39,311 trucks and buses registered in the state of which, 1,179 passenger cars and 667 trucks and buses were owned in other states. Assuming these proportions to exist in former years, it is estimated that passenger cars and trucks and buses owned in this state will have increased as follows:

Year	Passenger Cars			Trucks & Buses		
	Total Registration	Owned in Other States	Owned in Montana	Total Registration	Owned in Other States	Owned in Montana
1930	109,549	1,010	108,539	25,619	435	25,184
1931	103,121	951	102,170	24,037	408	23,629
1932	88,611	817	87,794	20,521	348	20,173
1933	82,765	763	82,002	27,480	466	27,014
1934	97,249	897	96,352	31,087	527	30,560
1935	114,170	1,053	113,117	35,542	603	34,939
1936	127,839	1,179	126,660	39,311	667	38,644
1937	133,811	1,234	132,577	39,163	664	38,499
1938	130,208	1,201	129,007	41,118	698	40,420
1939	135,839	1,253	134,586	44,480	755	43,725

Operating on the same theory, registrations of state owned motor vehicles and county and city owned vehicles will have increased as per the following estimate.

Year	Passenger Cars		Trucks & Buses	
	State Owned Units	County & City Owned Units	State Owned Units	County & City Owned Units
1930	119	82	298	394
1931	112	77	279	369
1932	96	67	239	316
1933	90	62	319	422
1934	106	73	361	477
1935	124	86	413	546
1936	139	96	457	604
1937	145	100	455	601
1938	142	98	478	632
1939	148	102	517	683

Resolving the trend registration in accord with the proportions manifest in 1936 we have results as follows:

Year	Passenger Cars			Trucks and Buses			Passenger Cars		Trucks & Buses	
	Total Registration	Owned in Other States	Owned in Montana	Total Registration	Owned in Other States	Owned in Montana	Owned by State Governmental Depts.	Owned by Counties & Cities	Owned by State Governmental Depts.	Owned by Counties & Cities
1931	111,864	1,032	110,832	29,379	498	28,881	122	84	342	452
1932	115,316	1,064	114,252	31,959	543	31,416	125	87	372	492
1933	119,018	1,098	117,920	34,159	580	33,579	129	89	397	525
1934	122,805	1,133	121,672	36,145	613	35,532	134	92	420	555
1935	125,968	1,162	124,806	37,860	642	37,218	137	94	440	581
1936	128,996	1,190	127,806	39,582	672	38,910	140	97	460	608
1937	131,874	1,217	130,657	41,326	701	40,625	143	99	480	634
1938	134,189	1,238	132,951	42,841	727	42,114	146	101	498	658
1939	136,463	1,259	135,204	44,282	751	43,531	148	102	515	681
1940	138,812	1,281	137,531	45,533	773	44,760	151	104	529	699
1941	140,522	1,296	139,226	46,766	793	45,973	153	106	544	719
1942	142,432	1,314	141,118	47,883	812	47,071	155	107	557	736
1943	144,010	1,329	142,681	48,877	829	48,048	157	108	568	751
1944	145,301	1,340	143,961	49,813	845	48,968	158	109	579	765
1945	146,547	1,352	145,195	50,717	861	49,856	159	110	590	780
1946	147,709	1,363	146,346	51,628	876	50,752	160	111	600	793
1947	148,582	1,371	147,211	52,422	889	51,533	162	112	609	805
1948	149,385	1,378	148,007	53,226	903	52,323	162	112	619	818
1949	150,159	1,385	148,774	54,000	916	53,084	163	113	628	830
1950	150,679	1,390	149,289	54,718	928	53,790	164	113	636	841

Other assumptions necessary in the preparation of a supplementary forecast of gasoline are as follows:

(1) While we do not know the actual consumption per vehicle prior to 1936 and subsequent thereto, we may assume that passenger cars and trucks will use gasoline in the same ratio as in 1936.

(2) It is assumed that the gasoline consumption for county and city units has remained fairly constant and should approximate the rate of 1936, namely 729.17 gallons for passenger cars and 705.30 gallons for trucks.

(3) The Motor Vehicle Allocation Survey lists the gasoline consumption of those vehicles registered in Montana but owned in other states as originating with foreign traffic.

(4) Since we are interested in estimating the gasoline consumption by vehicle classifications, we will combine the data concerning Montana registration and State owned motor vehicles. Data concerning county and city owned units will be set off subsequent to 1936 this being the time at which those governmental agencies were allowed refunds.

With due consideration being given for the points listed above we estimate the gasoline consumption classified by vehicle types to have been as follows:

Year	Gasoline Consumption Classified in Vehicle Type Categories (000 Gallons)											
	Passenger Cars				Trucks & Buses				All Vehicles			
	Owned & Registered in Montana & State, County & City Owned Vehicles 1/	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons, Corporations, Civil Agencies etc. which Contribute to Gross Gas Tax Revenues	Owned & Registered in Montana and State, County & City Owned Vehicles 1/	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons Corporations, Civil Agencies etc. which Contribute to Gross Gas Tax Revenues	Owned & Registered in Montana & State, County & City Owned Vehicles 1/	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons, Corporations, Civil Agencies, etc. which Contribute to Gross Gas Tax Revenues
1930	39,260		3,389	42,649	15,860		345	16,205	55,120		3,734	58,854
1931	40,373		3,411	43,784	16,232		347	16,579	56,605		3,758	60,363
1932	35,133		3,456	38,589	14,863		351	15,214	49,996		3,807	53,803
1933	32,212		3,961	36,173	18,450		403	18,853	50,662		4,364	55,026
1934	42,314		5,730	48,044	23,296		581	23,877	65,610		6,311	71,921
1935	45,220		6,712	51,932	24,278		681	24,959	69,498		7,393	76,891
1936	52,127		8,472	60,599	27,646		860	28,506	79,773		9,332	89,105
1937	54,206	73	9,492	63,771	26,965	424	964	28,353	81,171	497	10,456	92,124
1938	50,817	71	9,943	60,831	27,274	446	1,009	28,729	78,091	517	10,952	89,560
1939	54,491	74	10,168	64,733	30,326	482	1,032	31,840	84,817	556	11,200	96,573

1/ Subsequent to the year 1936 refunds were allowed for gasoline used in motor vehicles by County and City Governmental Agencies. The tabulation shows gasoline for locally owned vehicles and those operated by State Governmental Departments during the years 1937, 1938, 1939.

With these data as a basis it is estimated that the trend in gasoline consumption by each of the several vehicle types will be as follows:

Year	Trend of Gasoline Consumption Classified in Vehicle Type Categories (000 Gallons)											
	Passenger Cars				Trucks & Buses				All Vehicles			
	Owned & Registered in Montana & State, County & City Owned Vehicles	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons, Corporations, Civil Agencies etc. Which Contribute to Gross Gas Tax Revenues	Owned & Registered in Montana and State, County & City Owned Vehicles	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons Corporations, Civil Agencies etc. Which Contribute to Gross Gas Tax Revenues	Owned & Registered in Montana & State, County & City Owned Vehicles	Owned by County & City Departmental Agencies	Owned in Other States Including Those Registered in Montana	Owned by All Persons, Corporations, Civil Agencies, etc. Which Contribute to Gross Gas Tax Revenues
1931	33,337		2,706	36,043	15,153		274	15,427	48,490		2,980	51,470
1932	36,695		3,686	40,381	17,581		374	17,955	54,276		4,060	58,336
1933	39,960		4,766	44,726	19,808		484	20,292	59,768		5,250	65,018
1934	43,063		5,883	48,946	21,875		597	22,472	64,938		6,480	71,418
1935	45,936		6,995	52,931	23,818		710	24,528	69,754		7,705	77,459
1936	48,460		8,067	56,527	25,637		818	26,455	74,097		8,685	82,982
1937	50,741	74	8,801	59,616	27,026	455	893	28,374	77,767	529	9,694	87,990
1938	52,719	75	9,476	62,270	28,606	472	961	30,039	81,325	547	10,437	92,309
1939	54,709	76	10,079	64,864	30,175	489	1,023	31,687	84,884	565	11,102	96,551
1940	56,622	77	10,613	67,312	31,566	503	1,077	33,146	88,188	580	11,690	100,458
1941	58,229	78	11,077	69,384	32,937	517	1,124	34,578	91,166	595	12,201	103,962
1942	59,718	79	11,474	71,271	34,123	529	1,164	35,816	93,841	608	12,638	107,087
1943	61,019	80	11,824	72,923	35,198	540	1,200	36,938	96,217	620	13,024	109,861
1944	62,139	81	12,115	74,335	36,207	550	1,229	37,986	98,346	631	13,344	112,321
1945	63,110	82	12,362	75,554	37,122	560	1,254	38,936	100,232	642	13,616	114,490
1946	63,922	82	12,572	76,576	37,974	570	1,276	39,820	101,896	652	13,848	116,396
1947	64,620	83	12,746	77,449	38,749	579	1,293	40,621	103,369	662	14,039	118,070
1948	65,187	83	12,889	78,159	39,477	589	1,308	41,374	104,664	672	14,197	119,533
1949	65,665	84	13,009	78,758	40,136	597	1,320	42,053	105,801	681	14,329	120,811
1950	66,039	84	13,110	79,233	40,760	604	1,330	42,694	106,799	688	14,440	121,927

These data are shown graphically on Plate XVIII.

As an example in reading the graph see results as follows:

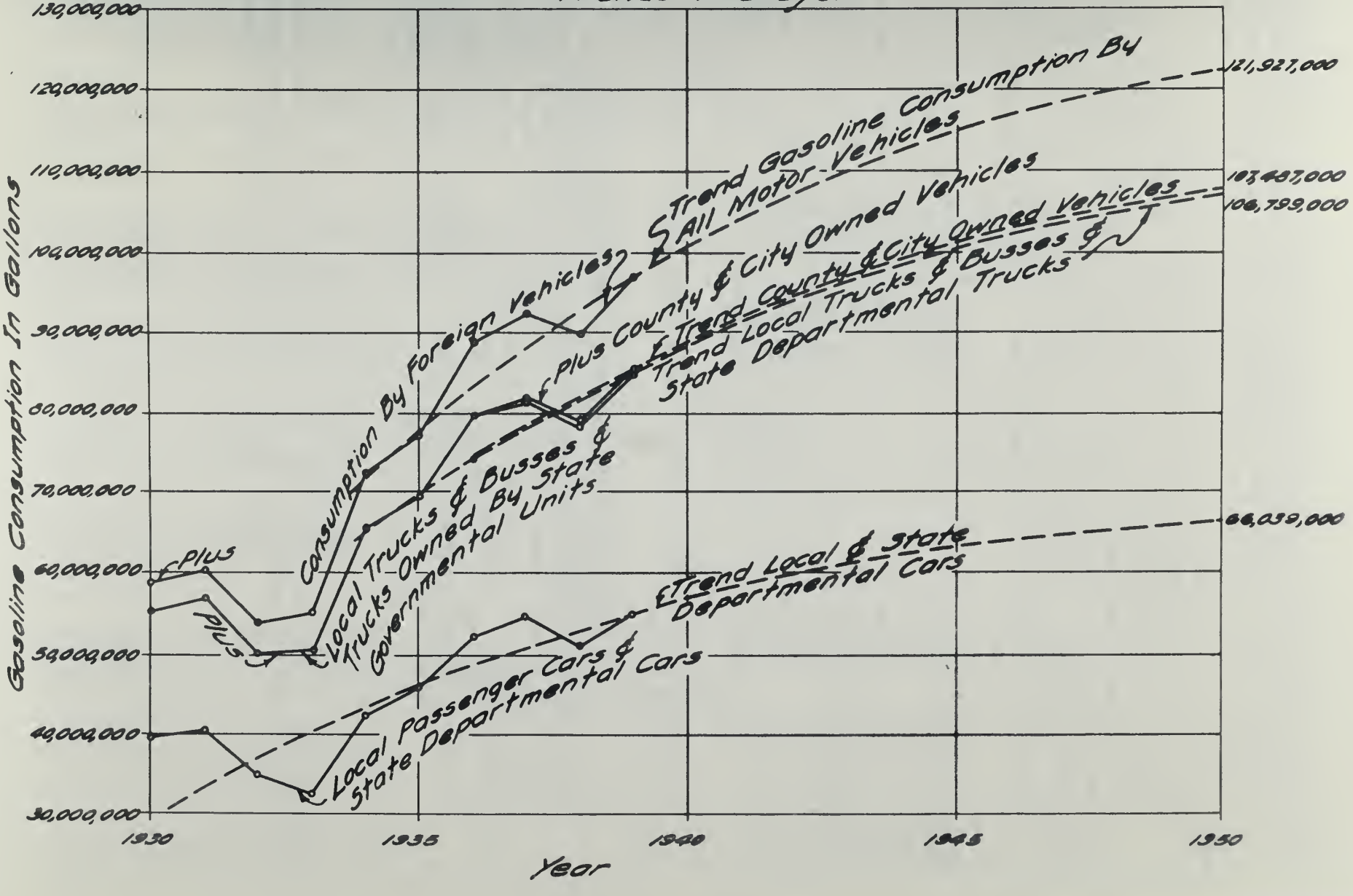
(a) In the year 1935, passenger cars owned and registered in Montana and those owned by governmental units of the State, the Counties and the Cities consumed 45,220,000 gallons.

(b) Trucks and buses owned and registered in Montana and trucks owned by governmental departments of the State, the Counties and the Cities along with the vehicles listed in caption (a) consumed 69,498,000 gallons of gasoline. Consumption by trucks and buses would be 69,498,000 less 45,220,000 gallons or 24,278,000 gallons.

(c) The total gasoline consumption including that listed in captions (a) and (b) and foreign vehicles would be 76,891,000 gallons. Gasoline consumption by foreign vehicles would be 76,891,000 less 69,498,000 or 7,393,000 gallons.

PLATE XIIII

Showing Gasoline Consumption Classified By Vehicle Types & Trends Therefor



4.042 Estimate of Future Gasoline Consumption Per Vehicle

Knowing the number of vehicles owned and registered in the State in each classification as set forth herebefore and the gasoline consumption therefor, we find the average consumption for each vehicle type to have been as follows:

Year	Gasoline Consumption Per Vehicle (Gallons)							
	Passenger Cars				Trucks & Buses			
	Owned & Registered in Montana & State County & City Owned Vehicles		Owned by Governmental Depts. of the counties and cities		Owned & Registered in Montana & State County & City Owned Vehicles		Owned by Governmental Depts. of the counties and cities	
	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle
1930	108,740	361.04			25,876	612.92		
1931	102,359	390.61			24,277	668.62		
1932	87,957	399.43			20,728	717.05		
1933	82,154	392.09			27,755	664.75		
1934	96,531	438.35			31,398	713.29		
1935	113,327	399.02			35,898	676.31		
1936	126,895	410.79			39,705	696.29		
1937	132,722	408.42	100	730.00	38,954	692.23	601	705.49
1938	129,149	393.48	98	724.49	40,898	666.88	632	705.70
1939	134,734	404.43	102	725.49	44,242	685.46	683	705.71

Resolving the trend data in similar manner beginning with the year 1939 we have results as follows:

Year	Trend in Gasoline Consumption Per Vehicle (Gallons)							
	Passenger Cars				Trucks & Buses			
	Owned & Registered in Montana & State County & City Owned Vehicles		Owned by Governmental Depts. of the counties and cities		Owned & Registered in Montana & State County & City Owned Vehicles		Owned by Governmental Depts. of the counties and cities	
	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle	Number	Consumption Per Vehicle
1936	128,043	378.47			39,978	641.25		
1937	130,800	387.93	99	747.48	41,105	657.49	634	717.67
1938	133,097	396.09	101	742.57	42,612	671.31	658	717.33
1939	135,352	404.20	102	745.10	44,046	685.08	681	718.06
1940	137,682	411.25	104	740.38	45,289	696.99	699	719.60
1941	139,379	417.77	106	735.85	46,517	708.06	719	719.05
1942	141,273	422.71	107	738.32	47,628	716.45	736	718.75
1943	142,838	427.19	108	740.74	48,616	724.00	751	719.04
1944	144,119	431.16	109	743.12	49,547	730.76	765	718.95
1945	145,354	434.18	110	745.45	50,446	735.88	780	717.95
1946	146,506	436.31	111	738.74	51,352	739.48	793	718.79
1947	147,373	438.48	112	741.07	52,142	743.14	805	719.25
1948	148,169	439.95	112	741.07	52,942	745.67	818	720.05
1949	148,937	440.89	113	743.36	53,712	747.24	830	719.28
1950	149,453	441.87	113	743.36	54,426	748.91	841	718.19

4.05 Forecast of Future Traffic Volume

Given the estimated gasoline consumption of all vehicles and the estimated consumption per vehicle and knowledge concerning the average mileage per gallon for passenger cars and for trucks, we may render an estimate with respect to the total vehicle miles generated on the roads and streets of Montana. According to findings of the Motor Vehicle Allocation Survey the average mileage per gallon of gasoline for passenger cars, trucks and buses was 16.6 miles and 9.9 miles respectively.

With these data at hand, the Road Use Survey was prepared to render an estimate of the vehicle mileage on all the roads and streets of Montana by vehicles owned and registered in the State. To arrive at a figure approximating the total vehicle mileage generated in the state by all vehicles, foreign and local, we have only to divide the known gasoline consumption of these units by the average mileage per gallon of gasoline and add the results to the vehicle mileage set forth in the Road Use Survey.

Before doing this, however, we must recognize that the efficiency of the motor vehicle is increasing to an end that we are getting more miles per gallon and from data at hand in the Motor Vehicle Allocation Survey, we may expect this efficiency to increase as set forth hereafter. These results are obtained through the use of the "method of least squares" and are based on gas mileages estimated for each year model motor vehicle as set forth in the Motor Vehicle Allocation Survey Report.

Showing Estimated Mileage Per Gallon of Gasoline
For Each Vehicle Type.

Year	Passenger Cars	Trucks & Buses
1936	16.60	9.90
1937	16.66	9.94
1938	16.72	9.98
1939	16.78	10.02
1940	16.84	10.06
1941	16.90	10.10
1942	16.96	10.15
1943	17.02	10.19
1944	17.08	10.23
1945	17.14	10.27
1946	17.20	10.31
1947	17.26	10.35
1948	17.32	10.39
1949	17.38	10.43
1950	17.44	10.47

The effect of using these estimated increases in gasoline mileage is to show a greater increase in traffic volume than in gasoline consumption and net receipts from the gasoline license tax levy.

1/ "method of least squares," The detailed development of the theory is omitted here for the reason that considerable mathematics are involved. The application of the method of least squares is comparitively simple and explanations may be found in any text treating with statistics.

Using the data set forth in the Road Use Survey and data set forth in Section 4.04 as it relates to the consumption by vehicle types and the average gas mileage set forth immediately herebefore, we may estimate the average traffic volume for each road system as follows:

AVERAGE TRAFFIC VOLUME CLASSIFIED BY SYSTEM DESIGNATION

System	Ownership Classification	Vehicle Type	Estimate of Traffic Volume by Calendar Years													
			1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Rural Federal Aid System	Owned & Registered in Montana	Passenger Cars	241	252	237	256											
		Trucks & Buses	66	65	67	74											
		All Vehicles	307	317	304	330											
	Owned in Other States Including Those Registered in Montana	Passenger Cars	58	65	66	70											
		Trucks & Buses	4	4	4	5											
		All Vehicles	62	69	70	75											
	All Owners	Passenger Cars	299	317	303	326											
		Trucks & Buses	70	69	71	79											
		All Vehicles	369	386	374	405											
Rural State Secondary System	Owned and Registered in Montana	Passenger Cars	79	83	78	84											
		Trucks & Buses	24	24	24	27											
		All Vehicles	103	107	102	111											
	Owned in Other States Including Those Registered in Montana	Passenger Cars	8	9	9	9											
		Trucks & Buses	1	1	1	1											
		All Vehicles	9	10	10	10											
	All Owners	Passenger Cars	87	92	87	93											
		Trucks & Buses	25	25	25	28											
		All Vehicles	112	117	112	121											
Rural Land Service System	Owned and Registered in Montana	Passenger Cars	8	8	8	8											
		Trucks & Buses	4	4	4	4											
		All Vehicles	12	12	12	12											
	Owned in Other States Including Those Registered in Montana	Passenger Cars				1											
		Trucks & Buses				0											
		All Vehicles				1											
	All Owners	Passenger Cars	8	8	8	9											
		Trucks & Buses	4	4	4	4											
		All Vehicles	12	12	12	13											

These data apply to road systems having lengths as follows:

Rural Federal Aid	5,419.0 miles
Rural State Secondary	3,282.8 miles
Land Service System	57,028.5 miles

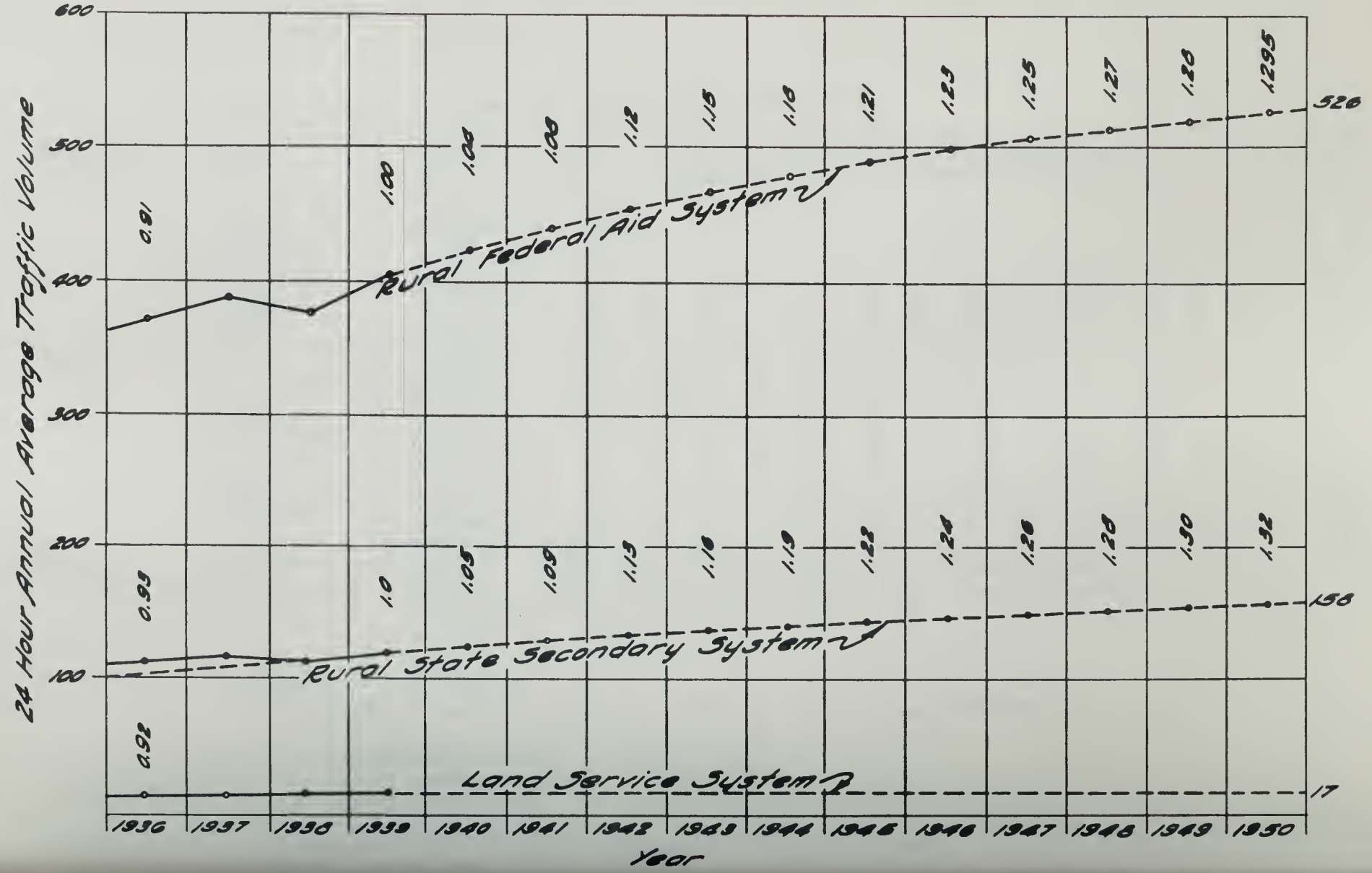
Applying the same procedure with respect to trends in traffic we have results as follows:

THE TREND IN TRAFFIC VOLUME CLASSIFIED BY SYSTEM DESIGNATION

System	Ownership Classification	Vehicle Type	Estimate of Traffic Volume by Calendar Years														
			1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
	Owned and Registered in Montana	Passenger Cars	225	236	246	257	266	275	283	290	297	302	307	312	316	319	322
		Trucks & Buses	61	66	70	74	78	81	85	88	91	94	96	98	100	102	104
		All Vehicles	286	302	316	331	344	356	368	378	388	396	403	410	416	421	426
	Owned in Other States Including Those Registered in Montana	Passenger Cars	55	60	65	70	74	77	80	83	85	87	89	91	92	93	94
		Trucks & Buses	4	4	4	5	5	5	5	5	6	6	6	6	6	6	6
		All Vehicles	59	64	69	75	79	82	85	88	91	93	95	97	98	99	100
Rural Federal Aid System	All Owners	Passenger Cars	280	296	311	327	340	352	363	373	382	389	396	403	408	412	416
		Trucks & Buses	65	70	74	79	83	86	90	93	97	100	102	104	106	108	110
		All Vehicles	345	366	385	406	423	438	453	466	479	489	498	507	514	520	526
	Owned and Registered in Montana	Passenger Cars	74	78	81	84	88	90	93	95	97	99	101	103	104	105	106
		Trucks & Buses	22	24	26	27	28	30	31	32	33	34	35	36	37	37	38
		All Vehicles	96	102	107	111	116	120	124	127	130	133	136	139	141	142	144
	Owned in Other States Including Those Registered in Montana	Passenger Cars	7	8	9	9	10	10	11	11	11	12	12	12	12	12	13
		Trucks & Buses					1	1	1	1	1	1	1	1	1	1	1
		All Vehicles	7	8	9	9	11	11	12	12	12	13	13	13	13	13	14
Rural State Secondary System	All Owners	Passenger Cars	81	86	90	93	98	100	104	106	108	111	113	115	116	117	119
		Trucks & Buses	22	24	26	27	29	31	32	33	34	35	36	37	38	38	39
		All Vehicles	103	110	116	120	127	131	136	139	142	146	149	152	154	155	158
	Owned and Registered in Montana	Passenger Cars	7	8	8	8	8	9	9	9	9	10	10	10	10	10	10
		Trucks & Buses	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6
		All Vehicles	11	12	12	12	12	14	14	14	14	15	16	16	16	16	16
	Owned in Other States Including Those Registered in Montana	Passenger Cars				1	1	1	1	1	1	1	1	1	1	1	1
		Trucks & Buses															
		All Vehicles				1	1	1	1	1	1	1	1	1	1	1	1
Rural Land Service System	All Owners	Passenger Cars	7	8	8	9	9	10	10	10	10	11	11	11	11	11	11
		Trucks & Buses	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6
		All Vehicles	11	12	12	13	13	15	15	15	15	16	17	17	17	17	17

PLATE XIX

Showing Trend In Traffic Growths & Indices Therefor



Trend values apply to systems identical in length with those set forth to show actual traffic volumes. As of the year 1950 the Federal Aid System and the State Secondary will undoubtedly be lengthened and the Land Service System will be shortened. The data as set forth furnish an index to traffic growth, in other words, given a piece of new road the traffic using the new road will increase for the next few years in accord with the trend in evidence in the tabulation.

The data pertaining to traffic are set forth graphically on Plate XIX as shown on page 4-20.

This chapter has been prepared to show what revenues we may reasonably expect in the future and the density of traffic in the future, since road design depends on some knowledge concerning the volume of traffic as it affects widths, alignment sight distance, etc. Traffic volumes as estimated herein are considerably in excess of those set forth in the Traffic Survey, in other words they represent traffic values for which we must design in the normal traffic period beginning in May and ending in September at which time the Department is called upon to serve the travelling public with a road system which is adequate in all design elements leading to safety and convenience in driving.

CHAPTER V

ESSENTIAL STANDARDS AND DETAILS OF ROAD DESIGN

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V
ESSENTIAL STANDARDS AND DETAILS OF ROADWAY DESIGN

Insofar as external or outward features of roadway design are concerned, the Road Inventory Survey and the Traffic Survey furnishes data concerning curvature, sight distance and steep grades, all colored or qualified by the volumes of traffic and characteristics thereof, which have occasion to use each of the several sections of the roadway system which are affected by each of these three design considerations. In a limited way the Survey sets forth information concerning topographic features governing design, viz: mountainous in the western part and rolling plains in the eastern part of the state.

When considered in composite, the application of knowledge concerning each or all of these several considerations operates towards an adequate or satisfactory factor of safety, since the prime essential is provision of sufficient unimpeded passing sight distance. A minimum passing sight distance comprehends a circumstance involving three vehicles; one approaching in the opposite lane, one passing and one being passed. Sufficient time and distance should be provided in the design to complete the operation at normal or legal speeds.

Other features affecting the design are those set forth by statute regarding speeds, load, and size restrictions. Regardless of legal limitations respecting speeds, it is incumbent on the design that facilities should be afforded to permit so called "safe speeds", which are advancing in consonance with motor vehicle design. Average carried loads are in a similar category as regards changing practice. Hard and fast design limits in connection with these two factors can be imposed only at such a time as we have detailed knowledge of inequities manifest in our present administrative structure whereby we construct highly reinforced and stabilized roadways for a minority of heavy haulers, the cost of which is distributed among the majority of highway users.

Continuing the discussion of loads and sizes, the Planning Survey has knowledge of their incidence or occurrence, but can formulate no criteria regarding quantities and design required to withstand the detrimental action of such traffic. However, the road inventory affords data concerning the effect of such traffic in terms of condition as of the period of the Survey. As regards the development of design standards, the Planning Survey is enabled to cite cause and affect only, and any progress in design development must be drawn from certain broad conclusions set forth hereafter as a circumstance of Montana's experience or study in other state highway departments.

5.01 Traffic Considerations — Statistics relating to traffic volumes point toward certain refinements in the design of adequate widths and the character of such traffic dictates that certain requisite precaution shall be taken to provide stability. The American Association of State Highway Officials takes the position that the maximum hourly traffic during any period of the day furnishes the critical juncture in any design consideration involving elements of traffic volume. This we believe to be correct since the rate of traffic occurrence or incidence provides the possibility of accident in greater or lesser degree, depending in turn on the measure of sight distance afforded by alignment and profile of the roadway.

On review of tables afforded in the course of the Traffic Survey, we find that the maximum hourly traffic during the period of above normal traffic (June through August) comprises 17.45% of the 24 hour annual average. For convenience and also

safety, we might better say 20% of the 24 hour annual average can be expected during the maximum hour period in the time of significant above normal traffic.

As traffic increases in volume, the composite speed decreases due principally to the presence of heavier commercial units which impose mental hazards in that the average driver hesitates to pass other vehicles unless guaranteed an adequate passing sight distance. Putting this statement in another way, we might say that to provide equal features of safety, we must design for a higher speed in the higher traffic volume brackets, and a design speed of say 45 miles per hour in the low traffic volume bracket might provide facilities for a composite speed equal to a 70 mile design in the higher traffic volume groups.

With these considerations in mind, we might well adapt for consideration the minimum standards of design as now used in Oregon. The statement of the standards is as follows:

OREGON STATE HIGHWAY DEPARTMENT

Minimum Standards For Design of Highways

Depending Upon Traffic Density, Character of Traffic, Assumed Designed Speed and Topography
(The required sight distances are based on safe stopping distances for various speeds)

Highway Classification		Maximum horizontal curve permited	Width of subgrade including ditches	Distance from center line to side obstruction 1:1 slope	Additional width required on inside blind curves	Horizontal Sight Distance		Minimum vertical sight distance required	Passing sight distance required	Maximum grade under 3000 feet	Maximum grade 3000 feet or over
Volume of Traffic anticipated per Hour	Safe Speed M.P.H.					Required	Provided				
		degrees	feet	feet	feet	feet	feet	feet	feet	per cent	per cent
500 M	70	3°	46	27.5	--	600	650	1200	2900	5	5
	60	6°	46	27.5	2.0	475	459	950	2900	6	5
	50	10°	46	27.5	--	350	356	700	2900	6	5
300 M	70	4°	42	25.5	5.0	600	541	1200	2900	5	5
	60	6°	42	25.5	4.0	475	442	950	2900	6	5
	50	10°	42	25.5	1.0	350	344	700	2900	6	5
150 M	70	4°	38	23.5	7.0	600	520	1200	2900	5	5
	60	6°	38	23.5	6.0	475	424	950	2900	6	6
	50	10°	38	23.5	3.0	350	330	700	2900	6	6
50 M	70	4°	34	21.5	9.0	600	497	1200	2900	5	5
	55	8°	34	21.5	10.0	425	352	850	2900	6	6
	45	12°	34	21.5	5.0	320	288	640	2900	6	6
25 M	60	6°	30	19.5	10.0	475	387	950	2900	5	5
	45	12°	30	19.5	7.0	320	274	640	2900	6	6
	35	18°	30	19.5	2.0	235	224	470	2900	6	6
10 M	45	12°	26	17.5	9.0	320	259	640	2900	6	6
	35	18°	26	17.5	4.0	235	212	470	2900	7	7
	20	56°	26	17.5	--	115	121	230	2900	7	7

In accord with the decision of the American Association of State Highway Officials, highways are now classified according to (1) traffic density; (2) character of traffic; and (3) assumed design speed. The assumed speed is further affected by the character of the topography which has a material effect upon the cost of construction.

The volume of traffic shown indicates the average maximum hour-traffic during the summer months. The letter M indicates that the traffic is mixed in character, being in part passenger cars and in part trucks. The speeds are indicative of the character of the topography. The first speed indicates a design for level country; the second, a design for rolling country and foothills: the third a design for heavy mountain construction. In all cases, the curvature used must provide the requisite horizontal sight distance for the maximum safe speed on the curves by widening the inside of blind curves in accordance with Table No. 2. The vertical sight distance on tangents should be such as to afford a safe speed of 70 miles per hour unless specific orders are transmitted from the State Highway engineer to lower the designed speed of a particular highway. The vertical sight distance on curves should be the requisite amount for the safe speed of the curve in question. Locating engineers are requested to use the maximum curves only where topography or other conditions of the terrain make the use of lighter curves too expensive. Where possible passing sight distance should be increased to 3200 feet.

Montana's standards are designed generally to accommodate varying volumes of traffic. The surfaced width as designed has not within recent years been less than 18 feet. On those recent construction projects along the main or through routes with a high level of traffic usage the surfaced widths have been increased to 24 feet. Secondary roads and roads on the Federal Aid System of lesser importance with corresponding lesser traffic volumes have been designed with surfaced widths of 20 feet.

With a view toward utilizing the present Montana standards, and the tendencies in the Oregon design as a basis for discussion of surfaced widths in relationship with traffic volumes, we may set tentative standards as follows:

Traffic Volumes		Design Widths		
Maximum Hour	24 Hour Annual Average	Surface	Shoulders	Total
10	Less than 70	18	6	24
25	70 - 174	20	6	26
50	175 - 349	22	8	30
150	350 - 1049	24	10	34
300	1050 - 2099	27	10	37
500	2100 - Over	30	10	40

These standards would conform to general practice in the state for the lower traffic volume, i.e. up to an average of less than 175 vehicles per mile per day. There are no standards at present limiting the surfaced width to 22 feet in the intermediate range of traffic volume, say up to 350 vehicles. As it happens in actuality, the greatest mileage of the Federal Aid System bears traffic volumes ranging from 100 to 199 vehicles per day and further, the greatest mileage of any one surface type (low type bituminous, 835.0 miles) bears traffic ranging from 200 - 299 vehicles per day. Thus it is seen that traffic volumes which range in the neighborhood of 250 vehicles per day are those which will generally engage the attention of the designer. Reference to standards in other states would indicate that the 22 foot section is ample and as a factor in highway economics could well be considered. Traffic volumes averaging more than 350 vehicles per day and less than 1050 vehicles per day will justify a 24 foot surfaced width, and the presumption is well supported by practice in other states.

On reference to standards in use in other states we would say that traffic volumes greater than 1049 vehicles per day per mile would require surface widths in excess of twenty-four feet. In line with this presumption this department has set up a twenty-seven foot surface width as being adequate for traffic in the volume range 1050-2099 and a thirty foot surface width for all traffic in excess of 2099 feet. These values are not to be taken too literally since this department is not prepared to state unequivocally as regards an adequate surface width for traffic volumes in excess of 1049 vehicles per day per mile. Neither is the department ready to say that three lane highways are adequate to serve this traffic volume although the dimensions, 27 feet and 30 feet, would suggest that we favor the construction of three lane highways for traffic in the higher traffic volume brackets. As a matter of fact, the engineering staff of the Montana Highway Department is opposed to the construction of three lane highways for reasons attaching to safety considerations. At the same time this staff has not definitely stated its position as regards the construction of four lane highways nor have they stated any critical traffic density which would in their opinion, dictate the necessity for the construction of four lane highways. We are all agreed, however, on the proposition that greater surface widths are necessary for service of traffic in the higher traffic volume brackets, and further, we are agreed that the construction of wider roads entails an increased cost. This brings us then to a point whereby we qualify the 27 foot and 30 foot standard as an expedient basis in anticipation of increased cost for construction of wider highways in service of the higher traffic volumes. By so doing we present a premise in comparison and in forecast of future highway costs. It is possible that we may continue to build 24 foot surfaced widths to serve up to 2100 vehicles per day per mile; for traffic volumes in excess of 2099 vehicles per day, we may in the future build four lane highways. In the comparisons and forecasts which follow in subsequent chapters of this report we will present estimates of costs on a 27 foot surfaced width basis which will be considerably in excess of probable costs. On the other hand, those sections which we estimate will serve traffic in excess of 2099 vehicles per day will probably cost more than what we have forecast for the cost of a 30 foot surfaced width. In effect then we expect the under-run in the first possibility to balance the over-run in the second. Repeating the essentials of the discussion in the paragraph, tentative surface widths of twenty-seven feet and thirty feet are not truly representative of the policy of the Montana Highway Department in the design of surface widths in service of traffic in higher volume groups; these widths, however, and the estimated costs therefor, furnish an index to round out an estimate of costs for a system complete in all details as of 1950 as brought out in subsequent chapters of this report.

5.02 **Minimum Standards of Curvature**

Practice in the state in the past has limited curvature to curves of not more than 16° in mountainous areas. Adverting to the Oregon standards, we find similar controls generally in effect. If next we omit the "level" classification in the Oregon standard, and use the "rolling" classification in eastern Montana and the "mountainous" classification in western Montana, we have limits as follows:

Traffic Volumes		Maximum Degree of Curvature	
Maximum Hour	24 Hour Annual Average	Rolling	Mountainous
10	Less than 70	18°	56°
25	70 - 174	12°	18°
50	175 - 349	8°	12°
150	350 - 1049	6°	10°
300	1050 - 2099	6°	10°
500	2100 - Over	6°	10°

As stated in the Oregon outline, these standards are not rigid controls and the locating engineer would be governed as in the past by circumstances of topography and economical, yet practical considerations of construction.

5.03 Horizontal Sight Distance

Conforming to the Oregon design standards, we can further adapt them to our use. However, with due consideration for dissimilarity in topographic classification, we might better omit the "mountainous" classification and use the "level" classification for eastern Montana and the "rolling" classification for western Montana as follows:

Traffic Volumes		Minimum Horizontal Sight Distance	
Maximum Hour	24 Hour Annual Average	Level	Rolling
10	Less than 70	260	210
25	70 - 174	390	275
50	175 - 349	500	350
150	350 -1049	520	425
300	1050 -2099	540	440
500	2100 -over	650	460

Horizontal sight distances as set forth herebefore are possibly in conflict with normal sights obtained by use of the Oregon standards respecting curvature. However, it is believed advantageous under the circumstances to widen the borrow on the blind side of a curve as a function of snow clearance.

5.04 Vertical Sight Distance

Montana practice in connection with vertical sight distances is essentially the same as that of Oregon. Omitting the "mountainous" classification and using the "level" classification for eastern Montana, and the "rolling" classification for western Montana, we have standards as follows:

Traffic Volumes		Minimum Vertical Sight Distance	
Maximum Hour	24 Hour Annual Average	Level	Rolling
10	Less than 70	640	470
25	70 - 174	950	640
50	175 - 349	1200	850
150	350 -1049	1200	950
300	1050 -2099	1200	950
500	2100 -over	1200	950

The two considerations of horizontal sight distance and vertical sight distance enter as functions in the determination of sight distances set forth in section 2.09 and 2.10 of this report, hence the premise is afforded for an immediate comparison of actual sight distances opposed to those set up in the standards tabulated herebefore.

5.05 Maximum Gradient

Grades sustained at a constant high rate over a length of 3000 feet are the exception rather than the rule in Montana. The standards set forth in Oregon are entirely applicable in the state with the exception that the "level" classification will be omitted using the "rolling" classification in eastern Montana and the "mountainous" classification in western Montana.

Traffic Volumes		Maximum Grade Under 3000 Feet		Maximum Grade of 3000 Feet or Over	
Maximum Hour	24 Hour Annual Average	Rolling	Mountainous	Rolling	Mountainous
10	Less than 70	7%	7%	7%	7%
25	70- 174	6%	6%	6%	6%
50	175- 349	6%	6%	6%	6%
150	350-1049	6%	6%	6%	6%
300	1050-2099	6%	6%	5%	5%
500	2100-over	6%	6%	5%	5%

5.06 **Surface Type and Thickness** The use of bituminous treated surface courses in Montana is recommended for reasons of economy and adaptability, both in construction and maintenance. Thicknesses are governed by prevailing standards of practice. In Montana the standards dictate a $2\frac{1}{2}$ inch compacted thickness, although many roads now proving satisfactory have had but $1\frac{1}{2}$ inches of compacted depth. In short, there is a variance in opinion in the state as in other states with respect to an adequate depth of surfacing. Montana conceives the surface course to be the "roof" or waterproofing course, and that the loads are transmitted to the founding course, hence the problem of adequate thickness does not revolve around the thickness of the surface treated material, but is of greatest importance with respect to the depth of the founding course. The depth of the founding course is dependent in turn on the composition and characteristic behavior of the soil used in the construction of the fill. These features of the design can be determined only after a detailed field survey and obviously the soils change radically from one district to another. The problem is one of prime local importance and certainly no broad or comprehensive controls can be established at this time.

Suffice to say, for purposes of discussion, the standard practice will continue in the field of bituminous surfacing. With respect to the founding course, the standards recommend a $6\frac{1}{2}$ inch lift for all roads in the state and any increase in this depth is dependent, of course, on local conditions.

5.07 **Statutory Controls** The traffic laws of the state dictate controls respecting speeds as follows:

1. The maximum speed at night shall not exceed 55 miles per hour.
2. On all sharp curves marked with standard highway curve markers, the speed limit shall be 40 miles per hour.
3. All motor vehicles traveling upon the highways of this state shall be able to completely stop all forward motion of such vehicle on a smooth dry level highway, free from all loose materials in the following designated stopping distance:

Miles Per Hour	Stopping Distance
10	9 feet
15	20 feet
20	37 feet

These restrictions are entirely in accord with the design speeds set forth in the Oregon outline, and repeating the essence of previous discussion, the design speed and appurtenant horizontal and vertical clearances are essentially provisions for satisfactory safe capacity.

Restrictions with respect to sizes and loads are as follows:

a. "No vehicle shall exceed a total outside width, including load thereon, of eight (8) feet, except that the width of a farm tractor, or of loads of hay or straw, shall not exceed twelve (12) feet, and except further that the limitations as to size of vehicles stated in this section shall not apply to implements of husbandry, equipment structures or implements of industry, temporarily propelled or moved upon the public highways or to road machinery engaged in the construction or maintenance of highways".

b. "No vehicle unladen or with load shall exceed a height of fourteen (14) feet six (6) inches."

c. "No vehicle shall exceed a length of thirty-three (33) feet".

d. "No vehicle shall carry any load extending more than three (3) feet beyond the front thereof".

e. "No passenger vehicle shall carry any load extending beyond the line of the fenders on either side of such vehicle more than twelve (12) inches."

Regarding trailers and towed vehicles, we have the following restrictions:

a. "No motor vehicle shall be driven upon any highway drawing or having attached thereto more than one other vehicle."

b. "The draw bar, or other connection between any two (2) vehicles, one (1) of which is towing or drawing the other on a highway, shall not exceed fifteen (15) feet in length from one (1) vehicle to the other. Whenever such connection consists of a chain, rope or cable, there shall be displayed upon such connection a red flag or other signal or cloth not less than twelve (12) inches both in length and width".

c. "The total length of any combination of vehicles shall in no case exceed sixty (60) feet; provided, however, that the highway commission and local authorities in their respective jurisdiction may further limit the length of trailers on highways where curvature would make the use of long trailers dangerous to other traffic using the highway".

Restrictions with respect to weights of vehicles and loads are as follows:

"No vehicles of four (4) wheels whose gross weight including load is more than twenty-four thousand (24,000) pounds; no vehicle having a greater load than sixteen thousand eight hundred (16,800) pounds on one axle, and no vehicle having a load of over eight hundred (800) pounds per inch width of tire upon any wheel concentrated upon the surface of the highway (said width in the case of solid rubber tires to be measured between the flanges of the rim) shall be permitted on highways which are surfaced with gravel or higher type of surfacing. When axles are spaced less than eight (8) feet apart, the load on each axle shall not exceed eight thousand four hundred (8,400) pounds."

"Singular vehicular units of more than four (4) wheels operated without trailer or semi-trailer shall be permitted a gross weight not exceeding thirty-four thousand (34,000) pounds provided the gross weight on any axle does not exceed thirteen thousand (13,000) pounds."

These statutory provisions, as set forth herebefore, are of real significance when applied in research concerning capacity, passing sight distance and to a certain extent, adequate structural strength in the founding course and the subgrade. This latter consideration is particularly true as regards bridge design. However, in the design of a road we must consider not only the stresses imposed by loads but those imposed by the elements. Accordingly, any consideration of statutory load restriction, when combined with design standards set to withstand the adverse action of heavy traffic, must be tempered with knowledge concerning impact and effect of impact at varying degrees of stability induced as a consequence of weather and temperature change. Admittedly the state should build with a view toward uniform stability throughout the seasons, but limited funds do not permit the possibility of building on such a high plane of efficiency.

5.08 Summary of Conclusions

In summary, the Planning Survey is prepared to render certain broad conclusions with reference to the geometric features of the design generally consistent with advances made in other states as outlined heretofore. The conclusions are based on information deriving from a statewide study, hence the outline will not throw any light on any specific problem of locale, but should point the way toward future development consistent with trends in industry and agriculture over the state at large. With respect to features of internal design, the Planning Survey cannot make specific recommendation other than those

relating to cause and effect. Generally speaking, as we raise our standards, costs increase on a mileage basis but tend to decrease on the unit item basis. As we reconstruct and realign the system to an accepted modern high standard we are using an original base as part of the structure. It is probable that at some time in the future as our standards improve in consonance with motor vehicle development, reconstruction will consist principally of re-surfacing with the cost thereof assuming the constancy and identity of characteristic maintenance or replacement values.

CHAPTER VI

STATUS OF ROADWAY SYSTEM WITH RESPECT TO TENTATIVE STANDARDS DEVELOPED IN CHAPTER V

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VI

STATUS OF ROADWAY SYSTEM WITH RESPECT TO TENTATIVE STANDARDS DEVELOPED IN CHAPTER V.

Based on the criteria developed in Chapter V, we find that the systems exist generally below the standards there set forth, particularly with respect to surface width consideration. However, it is found that contemporary reconstructions are built to higher width standards than are necessary for present traffic volumes. In keeping with progressive design and construction standards this apparent "over design" is qualified when we consider that the department is building to accommodate increased traffic volumes in the future. The same condition occurs in connection with many new construction projects on the State Secondary System or Feeder Road System.

6.01--Comparison on Basis of Width Standards

A. Federal Aid System

Tables 47A,B,C,D,E,F and G as follows present data concerning existing surface widths and average traffic volumes for each of the several surface types now in use on the Federal Aid System.

TABLE 47 A

Improved Mileage[1] on the Federal Aid System Classified by Surface Widths and Average Traffic Volumes.

County	Bituminous Macadam																	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over		All Widths	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Cascade					2.9	614											2.9	614
District #6					2.9	614											2.9	614
Statewide					2.9	614											2.9	614

1/ See Table I for definition of "improved mileage".

TABLE 47 B

County	Concrete																	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over		All Widths	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Lake							0.5	724									0.5	724
District #1							0.5	724									0.5	724
Dawson							0.3	984									0.3	984
District #4							0.3	984									0.3	984
Fergus					1.2	822											1.2	822
District #5					1.2	822											1.2	822
Cascade							0.1	290									0.1	290
District #6							0.1	290									0.1	290
Mineral							0.1	490									0.1	490
Missoula					0.1	1630											0.1	1630
District #8					0.1	1630	0.1	490									0.2	1060
Deer Lodge					6.0	1246											6.0	1246
Madison											0.1	160					0.1	160
Silver Bow							5.1	859	9.3	2221							14.4	1756
District #9					8.0	1246	5.1	859	9.3	2221	0.1	160					22.5	1567
Park									0.1	380							0.1	380
District #10									0.1	380							0.1	380
Yellowstone					0.2	880											0.2	880
District #11					0.2	880											0.2	880
STATEWIDE					9.5	1190	6.1	840	9.4	2201	0.1	160					25.1	1469

TABLE 47 C

County	High Type Bituminous																All Widths	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over			
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead					46.4	219	21.9	717	0.1	360					0.2	355	68.6	384
Lake					26.3	455	28.3	670									54.6	566
Lincoln							2.7	240									2.7	240
District #1					72.7	304	52.9	668	0.1	360					0.2	355	125.9	457
Blaine					5.7	649	6.5	366			6.4	397					18.6	464
Glacier					11 4	115	15.3	333									26.7	240
Hill					17.4	472	5.0	420									22.4	461
Liberty					10.0	194	1.0	128									11.0	188
Toole							15.6	195									15.6	195
District #2					44.5	341	43.4	294			6.4	397					94.3	323
Phillips							7.4	317	17.3	436							24.7	400
Roosevelt							0.7	260									0.7	260
Sheridan									12.0	147							12.0	147
Valley									20.4	1651							20.4	1651
District #3							8.1	311	49.7	866							57.8	787
Dawson							20.4	279									20.4	279
Richland							10.0	716	3.8	600							13.8	684
Wibaux			2.6	305			8.3	269									10.9	277
District #4			2.6	305			38.7	389	3.8	600							45.1	402
Fergus					21.3	421					11.7	304					33.0	379
District #5					21.3	421					11.7	304					33.0	379
Cascade					25.8	579	19.2	453									45.0	525
Judith Basin					10.1	296					8.6	262					18.7	280
Teton							0.6	83									0.6	83
District #6					35.9	499	19.8	442			8.6	262					64.3	450
Broadwater					6.0	427	0.1	680			9.4	448					15.5	441
Jefferson					13.4	413	85.2	586			1.5	666					100.1	563
Lewis & Clark					6.6	504	33.4	532			7.9	845					47.9	579
District #7					26.0	439	118.7	571			18.8	633					163.5	556
Granite					28.1	283	8.4	653	8.3	733					0.2	740	45.0	437
Mineral					29.2	517											29.2	517
Missoula					41.2	795	29.6	933	3.2	156	1.8	566					75.8	817
Powell					51.9	529	5.0	644	5.4	727							61.9	555
Ravalli					44.2	487											44.2	487
Sanders					15.5	255	13.4	357									28.9	302
District #8					209.7	516	56.4	728	16.9	675	1.8	566			0.2	740	265.0	563
Beaverhead					85.9	307											85.9	307
Deer Lodge					14.5	695	16.4	612									30.9	650
Madison					15.1	262	5.2	207	2.1	285							22.7	251
Silver Bow					31.6	429	5.2	1007	4.5	858							41.3	548
District #9					147.4	367	26.8	609	6.6	676							180.8	414
Gallatin					28.7	889	10.7	350	0.4	827	9.7	1023					49.5	798
Park			0.1	620	54.5	502	19.0	473			0.1	380					73.7	594
Sweet Grass					12.9	609	23.5	528									36.4	557
District #10			0.1	620	96.1	626	53.2	472	0.4	827	9.8	1015					159.6	649
Carbon					4.2	262											4.2	262
Golden Valley							16.1	124									16.1	124
Stillwater					24.1	620	9.3	612	4.7	607							38.1	616
Treasure							28.7	357									28.7	357
Yellowstone					5.0	993	5.3	420									10.3	697
District #11					33.3	630	59.4	339	4.7	607							97.4	452

TABLE 47 C (Continued)

High Type Bituminous

County	Width Groups: Under 16 Mi.	Under 16 Tr.	16 - 17 Mi.	16 - 17 Tr.	18 - 19 Mi.	18 - 19 Tr.	20 - 21 Mi.	20 - 21 Tr.	22 - 23 Mi.	22 - 23 Tr.	24 - 25 Mi.	24 - 25 Tr.	26 - 27 Mi.	26 - 27 Tr.	28 & Over Mi.	28 & Over Tr.	All Widths Mi.	All Widths Tr.
Custer					14.4	443	13.0	549									27.4	493
Fallon											3.4	181					3.4	181
Rosebud					25.5	454											25.5	454
District #12					39.9	450	13.0	549			3.4	181					56.3	456
STATEWIDE			2.7	311	726.8	464	490.4	514	82 2	784	60.5	525			0.4	548	1363.0	500

TABLE 47 D

Low Type Bituminous

County	Width Groups: Under 16 Mi.	Under 16 Tr.	16 - 17 Mi.	16 - 17 Tr.	18 - 19 Mi.	18 - 19 Tr.	20 - 21 Mi.	20 - 21 Tr.	22 - 23 Mi.	22 - 23 Tr.	24 - 25 Mi.	24 - 25 Tr.	26 - 27 Mi.	26 - 27 Tr.	28 & Over Mi.	28 & Over Tr.	All Widths Mi.	All Widths Tr.
Flatheed	11.3	97	18.8	143	7.8	192	34.2	407	15.2	368							87.3	284
Lake					24.1	593											24.1	593
Lincoln	2.3	87			19.2	132					8.7	51					30.2	105
District #1	13.6	95	18.8	143	51.1	359	34.2	407	15.2	368	8.7	51					141.6	291
Bleine					26.9	565	5.2	405									32.1	539
Glacier					39.3	160	11.9	138	60.2	263							111.4	213
Hill					35.7	352	4.6	338					18.2	362			58.5	355
Liberty			6.4	210	7.3	146											13.7	176
Toole					33 5	300	21.5	308	16.1	445							71.1	335
District #2			6.4	210	142.7	317	43.2	276	76.3	327			18.2	362			286.8	307
Daniels					29.4	147	7.3	204			10.2	155					46.9	158
Phillips									28.8	335							28.8	335
Roosevelt	18.3	254			42.2	115	41.1	346	43.2	338							144.8	264
Sheridan					28.9	197			11.5	148							40.4	183
Valley							14.2	567	63.1	550							77.3	553
District #3	18.3	254			100.5	148	62.6	295	146.6	409	10.2	158					338.2	312
Dewson					52.8	176	6.9	128	23.8	276							83.5	201
McCone	1.8	194			7.6	116	19.4	116	13.1	90							41.9	111
Prairie					0.3	333			28.1	354							28.4	354
Richland					33.1	257	0.1	100	0.8	167							34.0	254
Wibaux							2.3	214									2.3	214
District #4	1.8	194			93.8	200	28.7	126	65.8	289							190.1	214
Fergus	9.1	131	21.1	271	16.2	185											46.4	214
Garfield					45.2	117	7.0	153	7.6	69					0.6	170	60.4	108
Petroleum					27.1	126					13.0	66					40.1	107
District #5	9.1	131	21.1	271	88.5	132	7.0	153	7.6	69	13.0	66			0.6	170	146.9	141
Cascade			12.2	232	63.2	399	19.0	307	17.0	722			8.6	580			120.0	426
Chouteau					64.4	423			4.9	362							71.3	419
Judith Basin							24.6	214	14.1	275							38.7	238
Pondere					17.2	130	31.2	352	3.8	111							52.2	261
Teton					48.6	240	22.1	372	10.2	81	10.0	74					90.9	236
District #6			12.2	232	195.4	344	96.9	313	50.0	313	10.0	74	8.6	580			373.1	336
Broadwater	7.6	236	10.9	402	23.0	307	22.6	91			0.4	366					61.5	243
Jefferson					4.6	784	0.9	220									5.5	692
Lewis & Clerk	6.9	75	34.1	71	17.5	176	23.9	588			4.3	122					86.7	238
District #7	14.5	174	45.0	151	45.1	305	47.4	344			4.7	143					156.7	256
Grenite					5.9	229	3.1	301			8.7	733					17.7	489
Minerel					24.7	538	24.5	581			0.6	515					49.8	559
Missoula			3.3	450	14.5	560											17.8	540
Ravalli									6.9	156							6.9	156
Sanders	21.9	236	18.7	116	32.6	184			12.6	338							85.8	205
District #8	21.9	236	22.0	166	77.7	370	27 6	550	19.5	273	9.3	718					178.0	364
Deer Lodge							3.5	299									3.5	299
Madison					4.9	134	66 8	167	0.1	30							71.8	164
Silver Bow									3.9	1674							3.9	1674
District #9					4.9	134	70.3	174	4.0	1633							79.2	245
Gallatin			9.5	266	17.3	183	2.3	214							0.4	280	29.5	213
Meagher	10.6	79			27.0	113	3.9	66	15.3	67	6.7	95					63.5	93
Park	13.1	220	14.5	281	2.6	485	3.6	173									33.8	261
Wheatland					41.4	191											44.4	191
District #10	23.7	157	24.0	275	91.3	175	9.8	148	15.3	67	6.7	95			0.4	280	171.2	172
Big Horn					22.4	352			56.1	441							78.5	416
Carbon	4.5	334			54.5	452			25.8	704							84.8	521
Golden Valley					6.9	149					5.1	150					12.0	150
Musselshell					36.6	376	6.5	[illegible]	16.6	235	3.4	138					63.1	320
Yellowstone					75.9	526	1.5	[illegible]	36.2	1064	3.4	1512			1.2	482	118.2	740
District #11	4.5	334			196.3	444	8.0	302	134.7	633	11.9	536			1.2	482	356.6	523
Carter							31.5	67	6.9	46							38.4	63
Custer			0.2	120	71.9	162	47.4	186	13.6	148							133.1	170
Fallon							18.5	117	8.4	156							26.9	129
Powder River	14.8	113			14.0	81			9.1	53	9.4	85					47.3	87
Rosebud			0.2	117	27.8	231							5.5	394			33.5	257
District #12	14.8	113	0.4	119	113.7	169	97.4	147	38.0	109	9.4	85	5.5	394			279.2	147
STATEWIDE	122.2	181	149.9	198	1201.0	284	533.1	265	573.0	415	83.9	214	32.3	375	2.2	360	2697.6	298

TABLE 47 E

County	Plain Macadam																	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over		All Widths	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	13.0	127	3.5	110							5.3	279					21.8	106
Lincoln	25.7	63					10.2	102			0.1	50	2.8	348			38.8	94
District #1	38.7	85	3.5	110			10.2	102			5.4	275	2.8	348			60.6	98
Glacier							14.3	75									14.3	75
District #2							14.3	75									14.3	75
Sheridan													10.1	96			10.1	96
District #3													10.1	96			10 1	96
McCone											7.8	10	7.2	60			15.0	34
Richland					3.8	45			3.4	129			0.7	202			7.9	95
District #4					3.8	45			3.4	129	7.8	10	7.9	73			22.9	55
Fergus			21.8	84	12.6	261											34.4	149
Garfield									40.3	72	0.2	70	12.7	96			53.2	78
District #5			21.8	84	12.6	261			40.3	72	0.2	70	12.7	96			87.6	106
Cascade	15.6	106			5.0	101											20.6	103
District #6	15.6	106			5.0	101											20.6	103
Granite											6.3	49					6.3	49
Missoula			3.2	100													3.2	100
Sanders					6.4	90											6.4	90
District #8			3.2	100	6.4	90					6.3	49					15.9	76
Madison	6.3	144									9.6	123					15.9	131
District #9	6.3	144									9.6	123					15.9	131
Meagher			1.8	85	2.8	98											4.6	93
Park			19.1	98													19.1	98
District #10			20.9	97	2.8	98											23.7	97
Carter			11.6	104													11.6	104
Fallon	37.0	141															37.0	141
Rosebud													12.7	25			12.7	25
District #12	37.0	141	11.6	104									12.7	25			61.3	110
STATEWIDE	97.6	113	61.0	95	30.6	135	24 5	86	43.7	77	29.3	105	46.2	88			332.9	99

TABLE 47 F

County	Plain Graval																	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over		All Widths	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead	3.2	218															3.2	218
Lincoln	21.2	54	3.1	183					2.7	125	1.0	241					28.0	82
District #1	24.4	75	3.1	183					2.7	125	1.0	241					31.2	96
Blaine					3.4	739											3.4	739
District #2					3.4	739											3.4	739
Cascade									2.9	126							2.9	126
District #6									2.9	126							2.9	126
Madison	8.9	106															8.9	106
District #9	8.9	106															8.9	106
Meagher					15.8	81	0.6	112	3.5	110							19.9	87
District #10					15.8	81	0.6	112	3.5	110							19.9	87
STATEWIDE	33.3	84	3.1	183	19.2	197	0.6	112	9.1	120	1.0	241					66.3	129

TABLE 47 G

County	Graded & Drained																	
	Width Groups																	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over		All Widths	
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
Flathead															4.1	45	4.1	45
Lake															6.6	44	6.6	44
Lincoln											7.6	50	15.6	70	8.5	69	31.7	65
District #1											7.6	50	15.6	70	19.2	55	42.4	60
Garfield											12.6	13			9.3	13	21.9	13
District #4											12.6	13			9.3	13	21.9	13
Granite	13.6	29															13.6	29
Missoula													1.7	100			1.7	100
Ravalli	7.9	53	8.6	55					7.5	51			16.1	68			40.1	59
District #8	21.5	38	8.6	55					7.5	51			17.8	71			55.4	53
Meagher											7.0	106					7.0	106
District #10											7.0	106					7.0	106
Big Horn													8.1	47			8.1	47
Musselshell															33.6	75	33.6	75
District #11													8.1	47	33.6	75	41.7	69
Powder River													24.2	22			24.2	22
District #12													24.2	22			24.2	22
STATEWIDE	21.5	38	8.6	55					7.5	51	27.2	47	65.7	50	62.1	60	192.6	52

Consolidating these data and classifying by average traffic volume groups, we have results as follows:

TABLE 48

Surface Width and Traffic Density Classification
of the Federal Aid System

Surface Types	Widths	Traffic Volume Groups																Total Mileage	Average Traffic
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 - 2999		
	Feet	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
Bituminous Macadam	18 - 19										2.9								2.9	614
	All Widths										2.9								2.9	614
Concrete	18 - 19												0.1	0.2	2.1	3.7	3.4		9.5	1190
	20 - 21						0.1		0.1	0.1	0.4	0.4	0.3	0.2	2.4	2.1			6.1	640
	22 - 23							0.1		0.1						0.2	8.4	0.6	9.4	2201
	24 - 25					0.1													0.1	160
	All Widths					0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.4	0.4	4.5	6.0	11.8	0.6	25.1	1189
High Type Bituminous	16 - 17						0.2	0.6	1.3	0.3	0.1								2.7	311
	18 - 19				0.1	14.8	70.6	151.4	228.0	138.9	64.6	16.5	38.0	2.4	0.6	0.4	0.4	0.1	726.8	464
	20 - 21			0.1	0.1	29.0	12.5	89.5	37.7	177.4	85.2	33.7	17.3	4.2	1.7	1.1	0.6	0.3	490.4	514
	22 - 23				0.1	9.7	2.4	0.9	23.9	8.7	3.6	12.6	4.7	1.7	1.1	1.9	5.9	5.0	82.2	784
	24 - 25					2.0	4.4	19.0	25.4	8.7	0.1	0.1	0.4	0.2	0.1	0.1			60.5	525
	28 & Over							0.1	0.1		0.1		0.1						0.4	548
	All Widths			0.1	0.3	55.9	90.1	261.7	316.4	334.0	153.7	62.9	60.5	8.5	3.5	3.5	6.9	5.4	1363.0	500
Low Type Bituminous	Under 16				14.4	42.1	65.7												122.2	181
	16 - 17				20.6	41.3	74.3	13.3	0.2										149.9	198
	18 - 19				6.1	435.0	302.7	137.8	156.0	158.6	4.6								1201.0	284
	20 - 21				27.7	140.7	213.6	51.0	29.9	38.1	24.9	7.2							533.1	265
	22 - 23				35.8	32.2	171.2	178.6	31.3	36.3	29.9	31.6	23.3	1.1	0.5	0.4	0.8		573.0	415
	24 - 25				26.4	28.6	0.5	0.3	0.3	1.7	7.2	10.1	7.8	0.1	0.1	0.2	0.4	0.2	83.9	214
	26 - 27						6.4	10.1	7.0	8.4	0.4								32.3	375
	28 & Over					0.4	0.8	0.3	0.3	0.3	0.1								2.2	360
	All Widths				131.2	720.3	835.2	391.4	225.0	243.6	67.1	48.9	31.1	1.2	0.6	0.6	1.2	0.2	2697.6	298
Plain Macadam	Under 16			4.7	19.0	73.9													97.6	113
	16 - 17				38.2	22.8													61.0	95
	18 - 19					30.6													30.6	135
	20 - 21				15.3	9.2													24.5	86
	22 - 23			2.1	31.6	10.0													43.7	77
	24 - 25	0.5	5.2	4.3	3.6	15.7													29.3	105
	26 - 27	0.1	5.3	5.3	15.3	20.2													46.2	88
	All Widths	0.6	10.5	16.4	123.0	182.4													332.9	99
Plain Gravel	Under 16				31.7	1.0	0.3	0.1	0.1	0.1									33.3	84
	16 - 17				0.8	0.8	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1					3.1	183
	18 - 19				15.9	1.5	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3				19.2	197
	20 - 21				0.2	0.3	0.1												0.6	112
	22 - 23				4.1	4.3	0.3	0.1	0.1	0.1	0.1								9.1	120
	24 - 25				0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1							1.0	241
	All Widths				52.8	8.2	1.5	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.3				66.3	129
Graded & Drained	Under 16		3.9	13.0	4.6														21.5	38
	16 - 17				8.6														8.6	55
	22 - 23				7.5														7.5	51
	24 - 25	2.7	9.3	4.0	6.0	5.2													27.2	47
	26 - 27		13.4	18.5	32.9	0.9													65.7	50
	28 & Over	1.9	8.0	7.1	45.1														62.1	60
	All Widths	4.6	34.6	42.6	104.7	6.1													192.6	52
All Improved Types	Under 16		3.9	17.7	69.7	117.0	66.0	0.1	0.1	0.1									274.6	133
	16 - 17				68.4	64.9	75.0	14.4	1.7	0.4	0.2	0.1	0.1	0.1					225.3	166
	18 - 19				22.1	481.9	373.5	289.3	304.1	297.8	72.3	16.7	38.4	2.9	3.0	4.1	3.8	0.1	1990.0	353
	20 - 21			0.1	43.3	179.2	226.3	140.5	67.7	215.6	110.5	41.3	17.6	4.4	4.1	3.2	0.6	0.3	1054.7	380
	22 - 23			2.1	79.1	56.2	173.9	179.7	55.3	45.2	33.6	41.2	28.0	2.8	1.6	2.5	15.1	5.6	724.9	452
	24 - 25	3.2	14.5	8.3	36.1	51.9	5.0	19.4	25.8	10.5	7.4	10.3	8.2	0.3	0.2	0.3	0.4	0.2	202.0	269
	26 - 27	0.1	18.7	23.8	48.2	21.1	6.4	10.1	7.0	8.4	0.4								144.2	135
	28 & Over	1.9	8.0	7.1	45.1	0.4	0.8	0.4	0.4	0.3	0.2		0.1						64.7	70
	All Widths	5.2	45.1	59.1	412.0	972.6	926.9	653.9	542.1	578.3	224.6	112.6	92.4	10.5	8.9	10.1	19.9	6.2	4680.4	338
Unimproved	All Widths	27.6	191.5	285.8	202.5	30.9	0.2	0.1											738.6	43
Total	All Widths	32.8	236.6	344.9	614.5	1003.5	927.1	654.0	542.1	578.3	224.6	112.6	92.4	10.5	8.9	10.1	19.9	6.2	5419.0	298

Platting these data graphically and reducing the 24 hour annual average traffic volume to maximum hour data, we have results as shown by the plates following. Since the surfaced widths increase by standar increments of two feet, from 18 feet to 24 feet and above 24 feet by increments of three feet, tolerances are allowed as follows:

1. An average of 69 vehicles per day denotes the greatest traffic volume which can readily be accommodated by an 18 foot surfaced width.
2. An average of 174 vehicles per day denotes the greatest traffic volume which can readily be accommodated by a 20 foot surfaced width.
3. An average of 349 vehicles per day denotes the greatest traffic volume which can readily be accommodated by a 22 foot surfaced width.
4. An average of 1049 vehicles per day denotes the greatest traffic volume which can readily be accommodated by a 24 foot surfaced width.
5. An average of 2099 vehicles per day denotes the greatest traffic volume which can readily be accommodated by a 27 foot surfaced width.
6. An average of 3499 vehicles per day denotes the greatest traffic volume which can readily be accommodated by a 30 foot surfaced width.

PLATE XVIII A

FEDERAL AID SYSTEM

Sketch Showing Total Mileage Having A Surface Width Less Than 16 Feet.

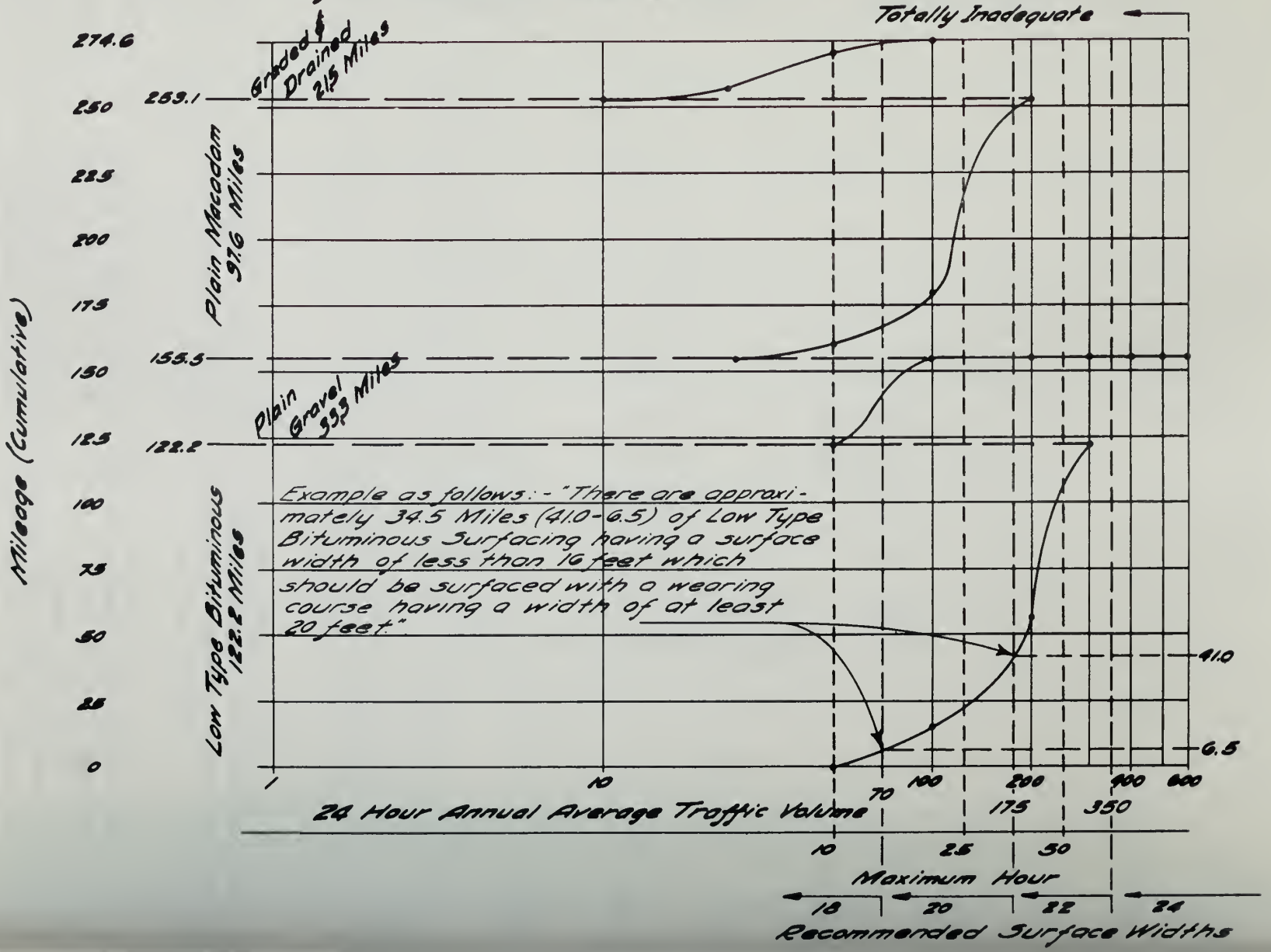


PLATE XVIII B

FEDERAL AID SYSTEM

Showing Total Mileage Having Surface Width of 16'-17'

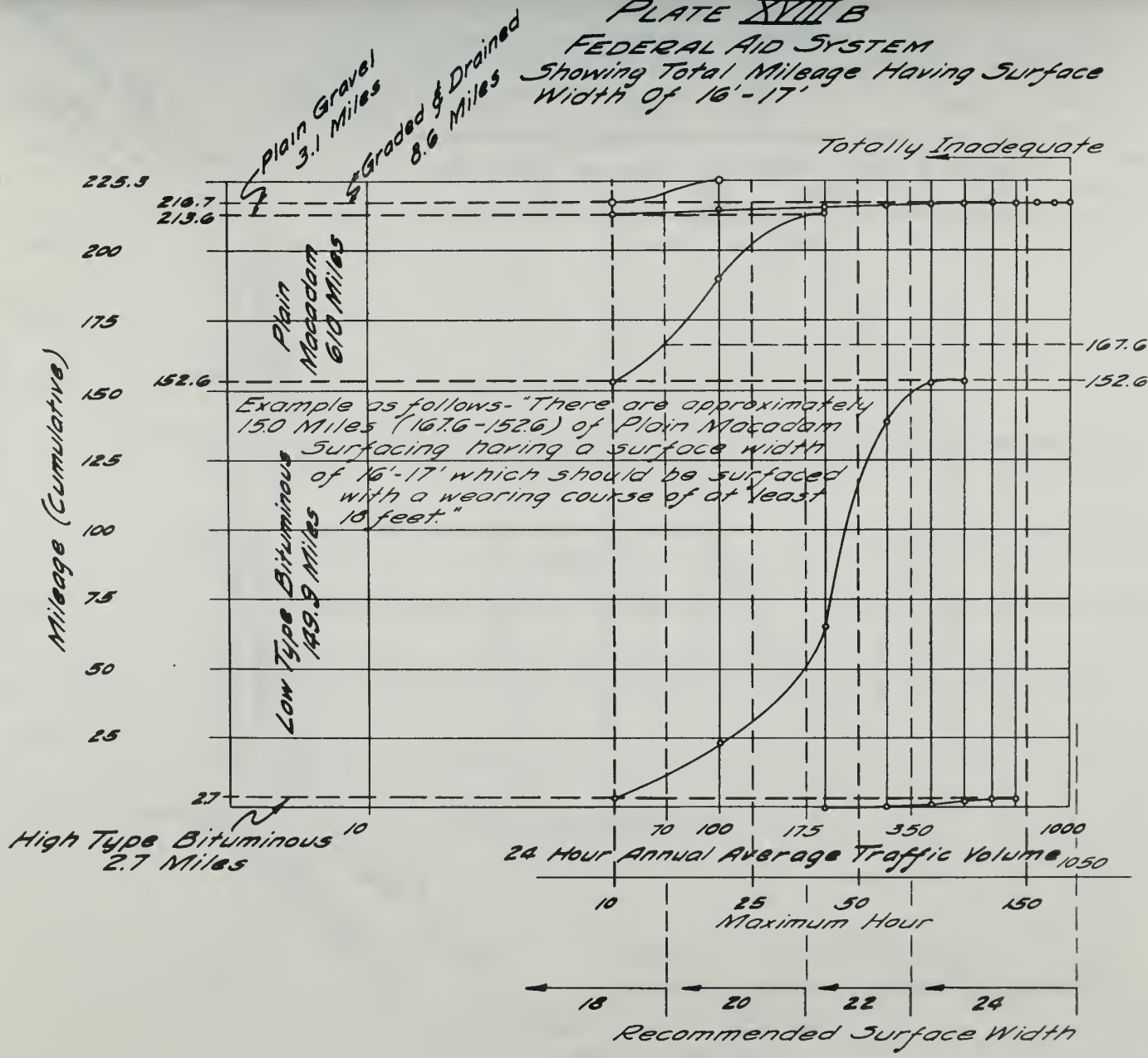
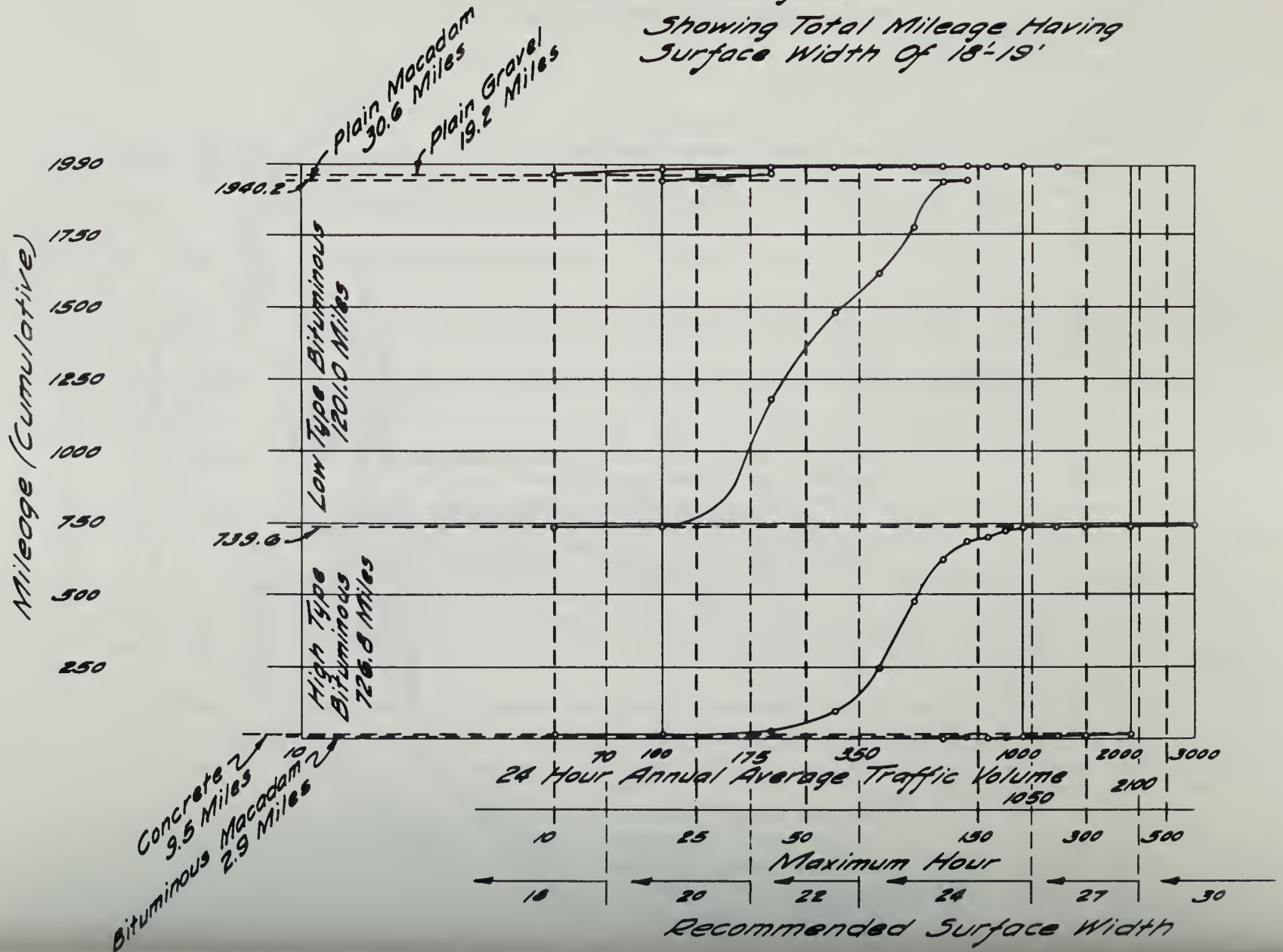


PLATE XVIII C
Federal Aid System
Showing Total Mileage Having Surface Width Of 18'-19'



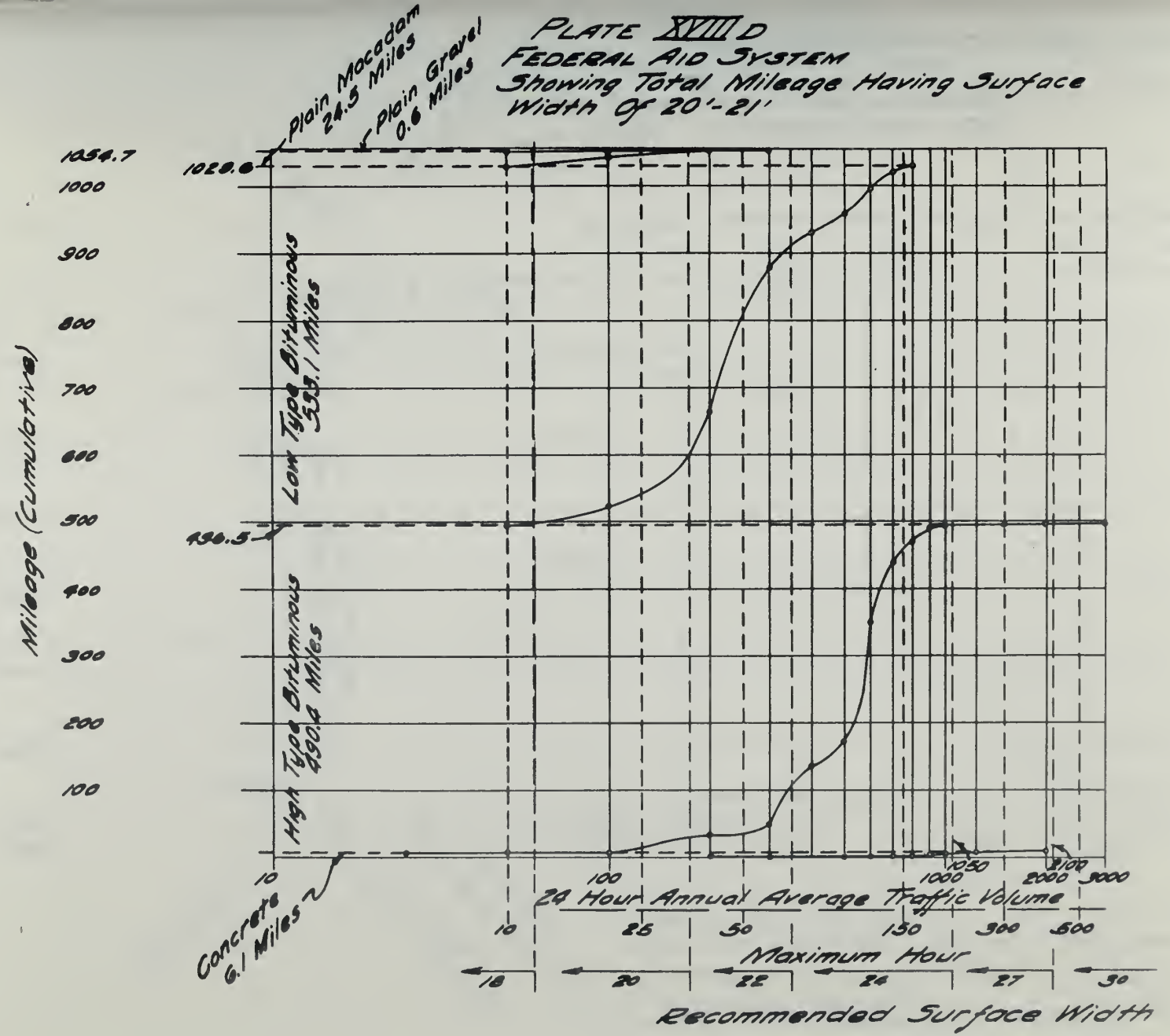


PLATE XVIII D
FEDERAL AID SYSTEM
Showing Total Mileage Having Surface Width Of 20'-21'
Plain Macadam 24.5 Miles
Plain Gravel 0.6 Miles
1054.7
1028.6
1000
900
800
700
600
500
490.5
400
300
200
100
Mileage (Cumulative)
Low Type Bituminous 539.1 Miles
High Type Bituminous 490.4 Miles
Concrete 6.1 Miles
10
100
1000
2000
3000
1050
2100
24 Hour Annual Average Traffic Volume
10
25
50
150
300
600
Maximum Hour
18
20
22
24
27
30
Recommended Surface Width

Plate XIII
Federal Aid System
Shoshone Village Planning Survey
Width of 22-23' Recommended Surface Width
Mileage (Cumulative)
100
200
300
400
500
600
700
724.3
Point 43.7 Miles Moscow
Point 9.1 Miles Grover
0.0 Miles
Low Type Bituminous
519.0 Miles
High Type Bituminous
22.2 Miles
0.0 Miles
Concrete
9.4 Miles
0
20
40
60
80
100
120
140
160
175
200
220
240
260
280
300
320
340
360
380
400
420
24 Hour Annual Average Traffic Volume
Maximum Hour
10
15
20
25
30
35
40
45
50
55
60

PLATE XVIII F

FEDERAL AID SYSTEM

Showing Total Mileage Having Surface Width Of 24' - 25'

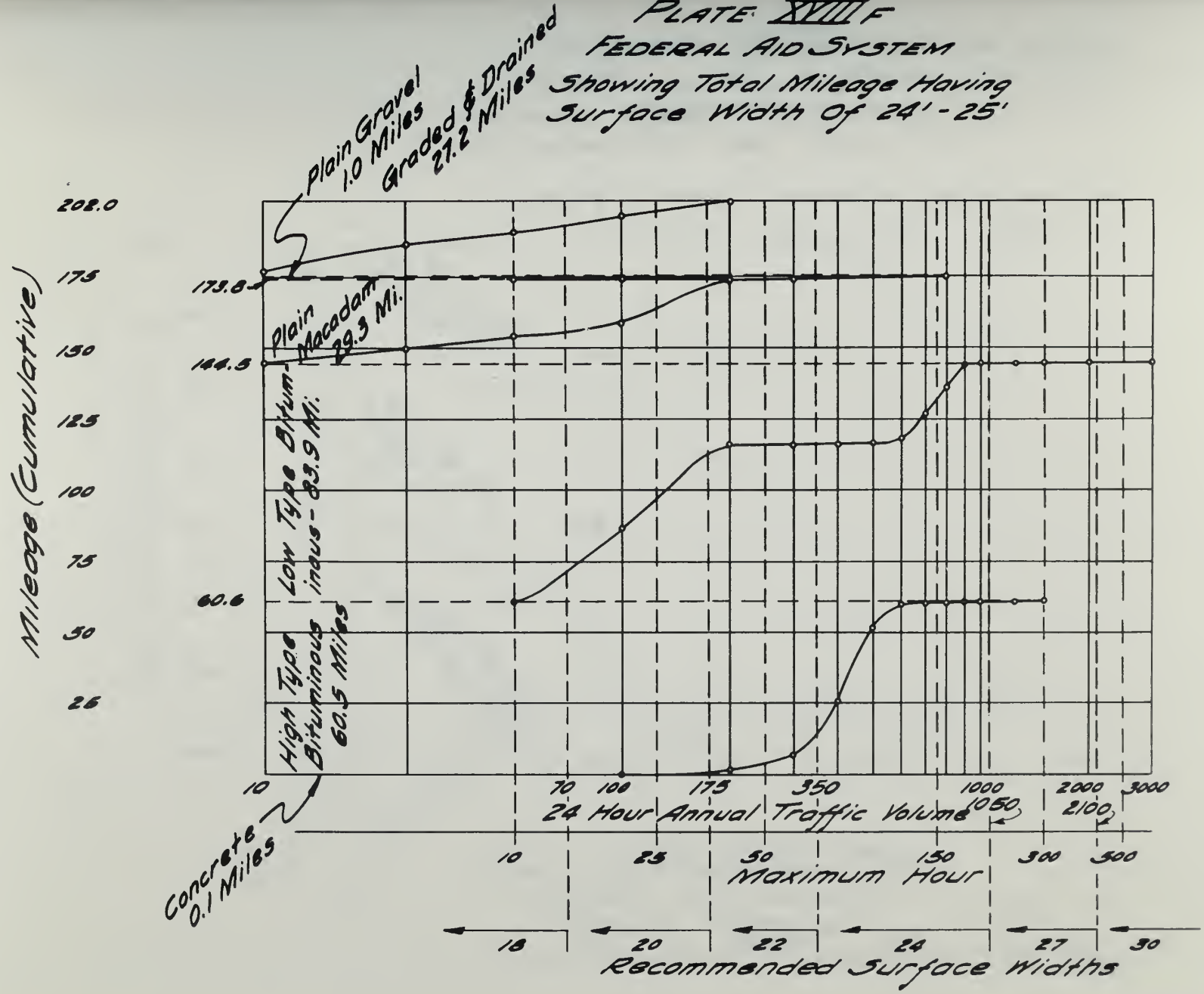


PLATE XVIII G

FEDERAL AID SYSTEM
Showing Total Mileage Having Surface Width Of 26'-27'

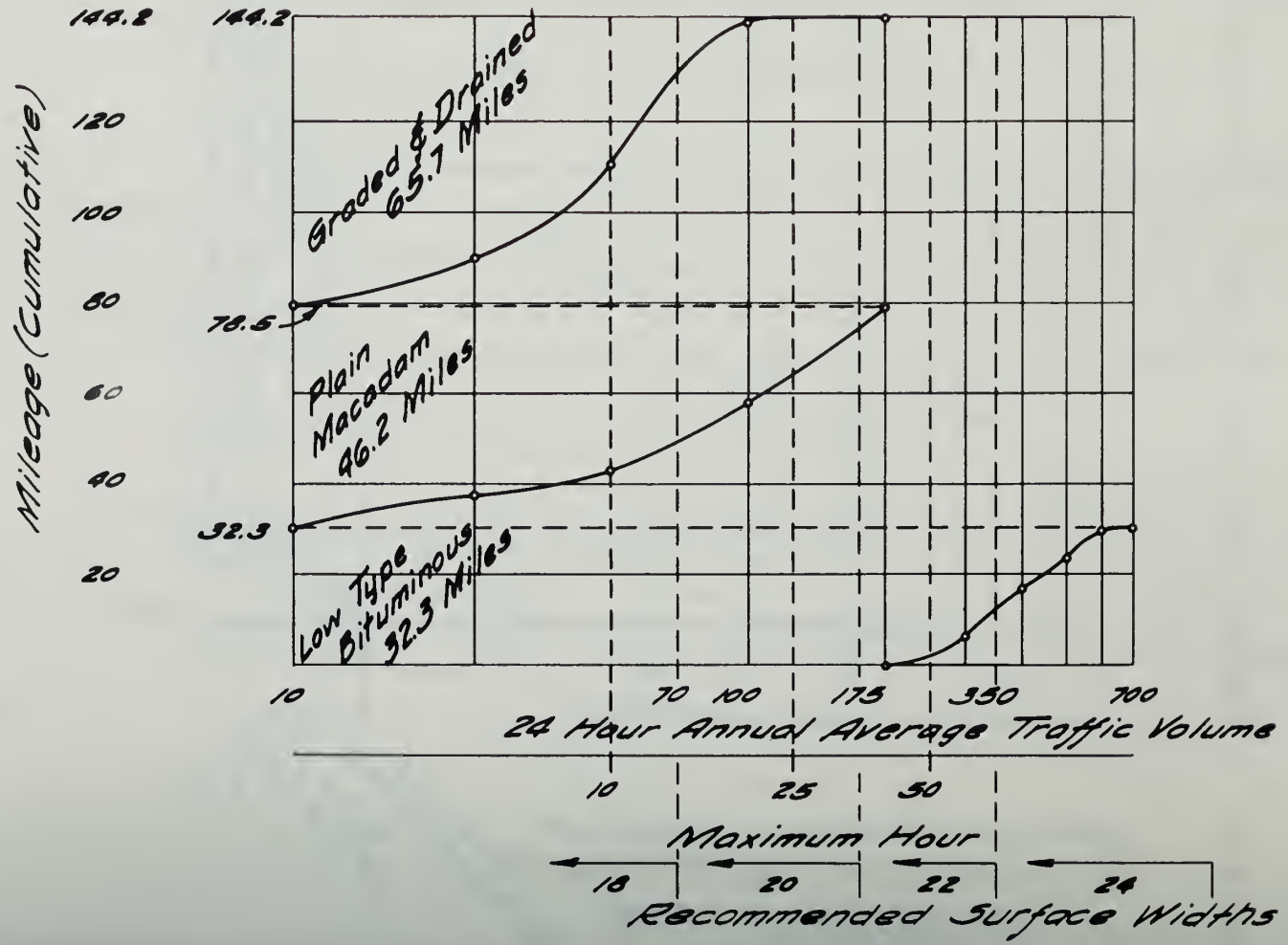


PLATE XVIII H
FEDERAL AID SYSTEM
Showing Total Mileage Having Surface Width Of 28' & Over

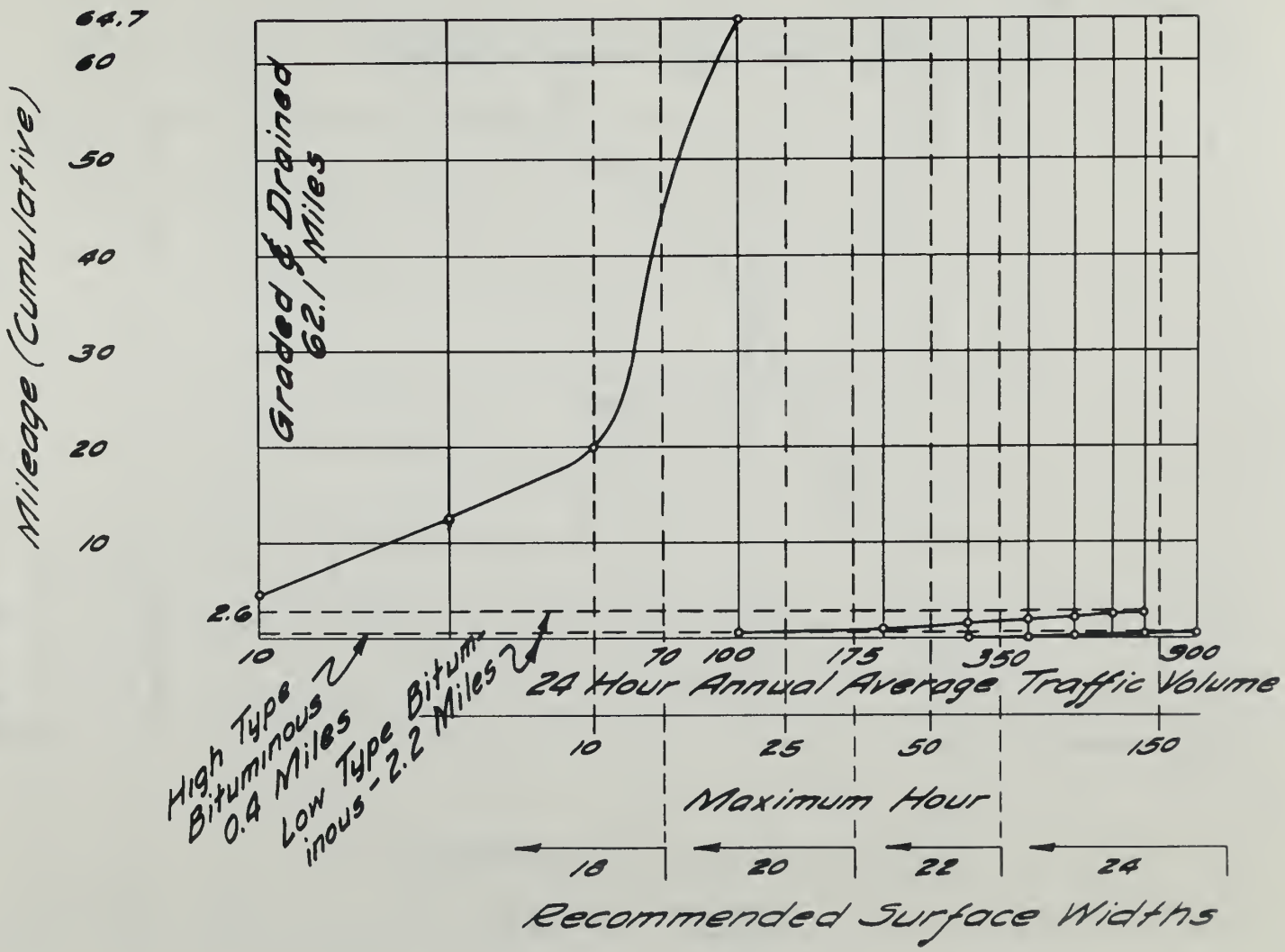


PLATE XVIII 1

Unimproved - Varying Widths

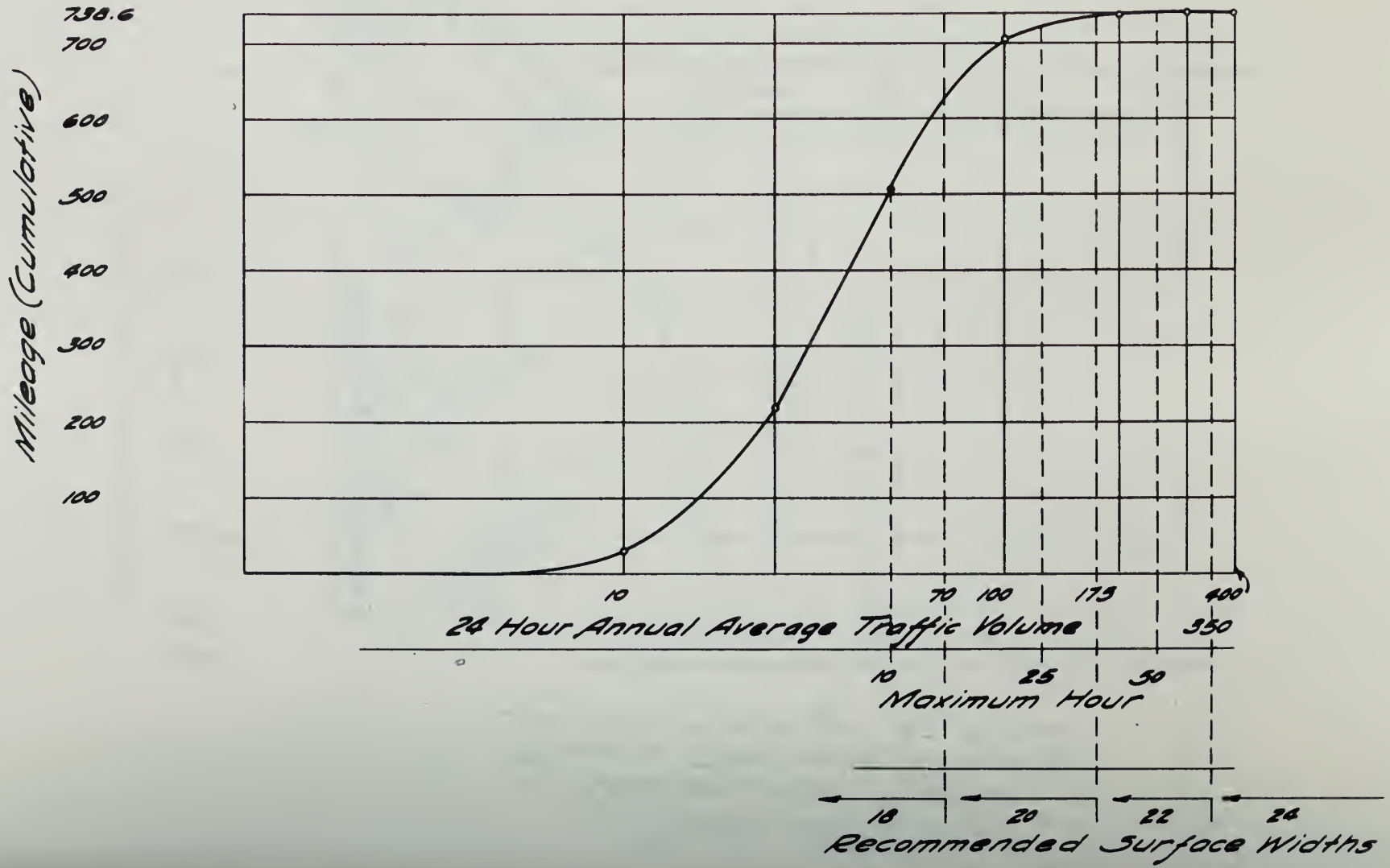


TABLE 49

Current Status of Federal Aid System
Classified by Surface Type and Width

Surface Type	Existing Widths								All Widths	Recommended Surfaced Width						Status with Respect to Tentative Standards		
	Under 16	16-17	18-19	20-21	22-23	24-25	26-27	28 & Over		16	20	22	24	27	30	Below Standard	According to Standard	Design for Future Traf.
Unimproved									730.6	640.0	90.6	7.9	0.1			730.6		
Graded & Drained	21.5	6.6		7.5		27.2	65.7	62.1	192.6	18.7 3.4 3.0 18.4 51.5 39.0 134.0	2.8 .2 4.5 7.5 14.0 23.1 57.1	1.3 0.2 1.5				21.5 6.6 30.1		7.5 27.2 65.7 62.1 162.5
Plain Gravel	33.3	3.1	19.2	0.6	9.1	1.0			66.3	17.8 0.3 6.4 0.1 1.6 0.5 26.2	14.7 2.0 11.3 0.5 7.1 0.5 36.1	0.6 0.5 0.5 0.4 2.9	0.2 0.3 0.8 1.3	0.2 0.2		33.3 3.1 12.8 49.2	6.4 0.5 0.6 7.3	0.1 8.7 1.0 9.8
Plain Macadam	97.6	61.0	30.6	24.9	43.7	29.3	46.2		332.9	12.3 15.3 6.1 14.7 11.4 20.0 79.6	80.2 40.0 23.0 16.1 21.5 14.0 21.2 221.0	5.1 5.7 7.6 2.3 2.5 3.9 5.0 32.1				97.6 61.0 30.6 2.3 191.5	16.1 2.5 18.6	6.1 41.2 29.3 46.2 122.8
Low Type Bituminous	122.2	149.9	1201.0	533.1	573.0	83.9	32.3	2.2	2697.6	5.8 8.3 2.4 11.1 14.3 10.6 52.5	34.2 33.5 322.7 98.4 46.6 41.3 0.3 576.0	82.2 104.0 487.6 309.0 306.0 3.9 11.4 1.2 1307.3	4.1 388.3 114.6 203.5 27.2 20.9 0.7 759.3	1.6 0.7 2.3	0.2 0.2	122.2 149.9 1198.6 423.6 205.1 0.9 2100.3	2.4 98.4 308.0 27.2 436.0	11.1 59.9 55.8 32.3 2.2 161.3
High Type Bituminous		2.7	726.8	490.4	82.2	60.5		0.4	1363.0	0.2	42.2	0.6 11.2 21.7 7.6 1.7 221.3	2.1 136.4 64.6 5.5 14.2 0.4 1080.6	577.8 400.5 55.4 44.6 13.6	1.3 3.1 9.2 4.9	0.1 0.3 4.5	2.7 726.8 468.5 69.1 1267.1	21.7 5.5 44.6 71.8	0.2 7.6 15.9 0.4 24.1
Concrete			9.5	6.1	9.4	0.1			25.1			0.1 0.1 0.3	3.1 2.0 0.1 5.2	6.4 4.0 0.7 19.1	0.5	9.5 6.1 9.3 24.9	0.1 0.1	0.1 0.1
Bituminous Macadam			2.9						2.9				2.9			2.9		
Improved	274.6	225.3	1990.0	1054.7	724.9	202.0	144.2	64.7	4680.4	54.6 27.3 8.8 17.5 33.6 40.4 61.8 35.0 292.7	131.9 80.7 366.2 136.7 91.3 65.0 44.9 27.4 932.4	67.9 110.8 632.1 376.0 316.5 23.9 16.6 1.2 1565.0	0.2 6.5 972.9 317.1 259.0 71.8 20.9 1.1 1849.5	7.9 7.1 19.5 0.7 35.2	0.1 0.3 5.0 0.2 5.6	274.6 225.3 1961.2 900.5 283.5 0.9 3666.0	8.8 136.7 316.5 71.8 533.8	17.5 124.9 129.3 144.2 64.7 480.6
Improved & Unimproved									5419.0	932.7	1023.0	1572.9	1849.6	35.2	5.6	4404.6	533.8	480.6

It is to be noted that unimproved sections of the system are listed as being entirely inadequate, while it is known that many sections thereof are in actuality entirely adequate in terms of surface width. However, since these sections were not brought to a uniform standard as aconsequence of strict engineering control, any improvements projected to follow these routes would, for the most part, ignore the condition as it exists in the field. Similarly those sections shown as graded and drained recommend ultimate surfaced widths as of the future and do not truly reflect adequacies or inadequacies through the sections.

Sections now surfaced with plain gravel are inadequate with respect to surface width through 74% of their length; 11% exist in a state of adequacy and 15% have been built to a standard which will accommodate estimated future traffic volumes.

Fifty-seven and one-half percent of the plain macadam is below standard with respect to surface width, 5.5% is adequate and 37% has been built to accommodate future traffic volumes.

Seventy-eight percent of the low type bituminous surfacing is inadequate with respect to surface width, 16% is entirely adequate and, 6% has been built to accommodate future traffic volumes.

Ninety-three percent of the high type bituminous paving exists in an inadequate state with respect to surface width, 5% is entirely adequate and 2% has been built to accommodate future traffic volumes.

Ninety-nine percent of the concrete paving is inadequate on the basis of width and the balance exists in an adequate state or better.

All bituminous macadam exists in an inadequate state with respect to surface width.

B. State Secondary System

The State Secondary System exists with respect to surface widths and traffic usage as follows:

TABLE 50
Improved Mileage on the State Secondary System
Classified by Surface Widths and Average Traffic Volumes

County	Width Groups: Under 16 Mi.	Under 16 Tr.	16 - 17 Mi.	16 - 17 Tr.	18 - 19 Mi.	18 - 19 Tr.	20 - 21 Mi.	20 - 21 Tr.	22 - 23 Mi.	22 - 23 Tr.	24 - 25 Mi.	24 - 25 Tr.	26 - 27 Mi.	26 - 27 Tr.	28 & Over Mi.	28 & Over Tr.	All Widths Mi.	All Widths Tr.
Concrete																		
Hill													0.2	375			0.2	375
District #2													0.2	375			0.2	375
Silver Bow							1.1	1329									1.1	1329
District #9							1.1	1329									1.1	1329
Yellowstone					2.0	259											2.0	259
District #11					2.0	259											2.0	259
STATEWIDE					2.0	259	1.1	1329					0.2	375			3.3	622
High Type Bituminous																		
Deer Lodge					6.2	445											6.2	445
District #9					6.2	445											6.2	445
Gallatin			35.1	152	20.5	209	2.6	109									58.2	169
District #10			35.1	152	20.5	209	2.6	109									58.2	169
STATEWIDE			35.1	152	26.7	264	2.6	109									64.4	197
Low Type Bituminous																		
Flathead											0.4	35					0.4	35
Lake											5.6	141					5.6	141
District #1											6.0	134					6.0	134
Blaine															0.3	276	0.3	276
Glacier									9.7	555							9.7	555
District #2									9.7	555					0.3	276	10.0	547
Valley											8.3	835					8.3	835
District #3											8.3	835					8.3	835
Cascade							0.8	51									0.8	51
Chouteau					4.0	160											4.0	160
District #6					4.0	160	0.8	51									4.8	141
Lewis & Clark							0.1	80									0.1	80
District #7							0.1	80									0.1	80
Missoula							4.4	314			3.4	381					7.8	343
District #8							4.4	314			3.4	381					7.8	343
Deer Lodge			0.8	83	2.4	216									1.6	328	4.8	231
Silver Bow					4.0	125					3.8	95					7.8	111
District #9			0.8	83	6.4	159					3.8	95			1.6	328	12.6	157
Gallatin					10.8	192	12.5	702									23.3	466
Sweet Grass							0.6	235									0.6	235
Wheatland													0.5	96			0.5	96
District #10					10.8	192	13.1	600					0.5	96			24.4	453
Carbon					1.2	279											1.2	279
Stillwater									19.2	267							19.2	267
Yellowstone					2.3	196	6.7	218									9.0	213
District #11					3.5	225	6.7	218	19.2	267							29.4	251
STATEWIDE			0.8	83	24.7	183	25.1	470	28.9	364	21.5	438	0.5	96	1.9	319	103.4	361
Plain Macedam																		
Flathead							3.8	54	14.7	190							28.5	163
Lake									8.5	185	2.7	153					11.2	177
District #1							3.8	54	23.2	188	2.7	153					29.7	168
Hill											14.5	100					14.5	100
Liberty							4.7	72			10.0	62					14.7	65
Toole											3.7	28					3.7	28
District #2							4.7	72			28.2	77					32.9	78
Phillips					4.5	95					2.4	193	3.5	83			10.4	81
Sheridan							8.7	129									8.7	129
Valley			13.0	71							2.3	69					15.3	71
District #3			13.0	71	4.5	95	8.7	129			4.7	132	3.5	83			34.4	98
Prairie							11.4	89									11.4	89
Richland			0.7	126							10.2	88					10.9	90
Wibaux			5.9	163							4.4	90					10.3	132
District #4			6.6	159			11.4	89			14.6	88					32.6	103
Fergus			7.2	125							3.1	99					10.3	117
Petroleum											10.7	62					10.7	62
District #5			7.2	125							13.8	70					21.0	89
Cascade							7.6	68			8.7	103					16.3	86
Chouteau									5.2	105	5.8	28					11.0	64
Judith Basin			10.1	63													10.1	63
Pondera									11.1	85	3.5	118					14.6	93
Teton			9.0	58							5.5	55					14.5	57
District #6			19.1	61			7.6	68	16.3	91	23.5	75					66.5	74
Granite											2.4	111					2.4	111
Powell			11.5	57									2.8	50			14.3	56
District #8			11.5	57							2.4	111	2.8	50			16.7	64
Beaverhead			4.4	67							2.6	95					7.0	77
Deer Lodge			2.3	32							1.1	54					3.4	39
District #9			6.7	55							3.7	83					10.4	65
Gallatin			2.8	118							1.8	103					4.6	112
Meagher					6.4	85											6.4	85
Sweet Grass					5.1	180					2.9	159					8.0	172
Wheatland					5.2	97					4.9	76					10.1	87
District #10			2.8	118	16.7	118					9.6	106					29.1	114

TABLE 50 (Continued)

County	Width Groups																All Widths	
	Under 16		16 - 17		18 - 19		20 - 21		22 - 23		24 - 25		26 - 27		28 & Over			
	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.	Mi.	Tr.
								Plain Macadam										
Big Horn	3.0	38			3.2	43											6.3	200
Carbon					2.7	350	1.9	55									4.7	202
Golden Valley									5.1	81	6.2	56					11.3	67
Stillwater											2.3	42					2.3	42
Treasure											3.1	63					3.1	63
Yellowstone	1.0	130									2.2	94					3.2	79
District #11	4.0	57			5.9	130	1.9	55	5.1	81	14.3	51					30.9	127
Carter					4.8	82					2.3	44					7.1	69
Custer							1.8	66			8.2	12					10.0	21
Fallon	4.2	36															4.2	36
Rosebud			3.8	47			10.3	57									14.1	54
District #12	4.2	36	3.8	47	4.8	82	12.1	58			10.5	19					35.4	49
STATEWIDE	8.2	46	70.7	79	32.0	162	49.8	80	44.6	140	125.0	76	6.3	68			339.6	93
								Plain Gravel										
Flathead									2.4	149							2.4	149
District #1									2.4	149							2.4	149
Blaine							5.7	149			5.0	57			0.1	280	10.8	107
District #2							5.7	149			5.0	57			0.1	280	10.8	107
Cascade											2.3	59	2.7	49			5.0	53
Chouteau													4.3	43			4.3	43
District #6											2.3	59	7.0	45			9.3	48
Ravalli							0.3	67									0.3	67
Sanders			0.4	108													0.4	108
District #8			0.4	108			0.3	67									0.7	91
Meagher	10.4	65							2.0	77							12.4	67
District #10	10.4	65							2.0	77							12.4	67
Carbon							0.3	200									0.3	200
Musselshell	4.3	15															4.3	15
Stillwater							1.5	23									1.5	23
District #11	4.3	15					1.8	52									6.1	26
Powder River					4.2	35											4.2	35
Rosebud											2.6	35					2.6	35
District #12					4.2	35					2.6	35					6.8	35
STATEWIDE	14.7	50	0.4	108	4.2	35	7.8	123	4.4	116	9.9	52	7.0	45	0.1	280	48.5	67

TABLE 51
Surface Width and Traffic Density
Classification of the State Secondary System

Surface Types	Widths	Traffic Volume Groups														Total Mileage	Average Traffic
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	
	Feet	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
	18 - 19						1.7	0.3									2.0	259
	20 - 21								0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	1.1	1329
	26 - 27							0.1	0.1								0.2	375
Concrete	All Widths						1.7	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	3.3	622
	16 - 17					30.7	4.4										35.1	152
	18 - 19					8.5	12.7	1.2	1.2	1.2	1.2	0.7					26.7	264
High Type	20 - 21					2.6											2.6	109
Bituminous	All Widths					41.8	17.1	1.2	1.2	1.2	1.2	0.7					64.4	197
	16 - 17			0.2	0.3	0.3											0.8	83
	18 - 19					10.7	14.0										24.7	183
	20 - 21		0.1	0.1	1.1	2.0	2.9	4.6	4.8	5.0	3.5	0.1	0.2	0.1	0.3	0.3	25.1	470
	22 - 23					2.9	5.1	8.6	7.5	4.8							28.9	364
	24 - 25				2.2	4.4	2.5	2.1	1.6	4.1	2.9	0.2	0.2	0.2	0.6	0.5	21.5	438
	26 - 27				0.3	0.1	0.1										0.5	96
Low Type	28 & Over						0.3	1.6									1.9	319
Bituminous	All Widths		0.1	0.3	3.9	20.4	24.9	16.9	13.9	13.9	6.4	0.3	0.4	0.3	0.9	0.8	103.4	361
	Under 16			2.0	5.5	0.7											8.2	46
	16 - 17				61.3	9.4											70.7	79
	18 - 19				13.7	18.3											32.0	162
	20 - 21				43.8	6.0											49.8	80
	22 - 23				11.8	32.8											44.6	140
	24 - 25				96.7	31.3											128.0	76
Plain	26 - 27				6.3												6.3	68
Macadam	All Widths			2.0	239.1	98.5											339.6	93
	Under 16	0.8	3.6	3.1	6.3	0.9											14.7	50
	16 - 17					0.4											0.4	108
	18 - 19		0.2	1.0	3.0												4.2	35
	20 - 21		0.3	0.6	2.4	4.5											7.8	123
	22 - 23			0.1	1.6	2.7											4.4	116
	24 - 25			1.2	8.5	0.2											9.9	52
	26 - 27			2.8	3.7	0.5											7.0	45
Plain	28 & Over					0.1											0.1	280
Gravel	All Widths	0.8	4.1	8.8	25.5	9.3											48.5	67
	Under 16	0.8	3.6	5.1	11.8	1.6											22.9	49
	16 - 17			0.2	61.6	40.8	4.4										107.0	103
	18 - 19		0.2	1.0	16.7	37.5	28.4	1.5	1.2	1.2	1.2	0.7					89.6	194
	20 - 21		0.4	0.7	47.3	15.1	2.9	4.6	4.9	5.1	3.6	0.2	0.3	0.2	0.6	0.5	86.4	215
	22 - 23			0.1	13.4	38.4	5.1	8.6	7.5	4.8							77.9	222
	24 - 25			1.2	107.4	35.9	2.5	2.1	1.6	4.1	2.9	0.2	0.2	0.2	0.6	0.5	159.4	123
	26 - 27			2.8	10.3	0.6	0.1	0.1	0.1								14.0	62
	28 & Over					0.1	0.3	1.6									2.0	304
All Types	All Widths	0.8	4.2	11.1	268.5	170.0	43.7	18.5	15.3	15.2	7.7	1.1	0.5	0.4	1.2	1.0	559.2	156

These data when resolved into graphical presentation show results as follows:

PLATE XIX A
State Secondary System
Showing Total Mileage Having
Surface Width Of Under 16'

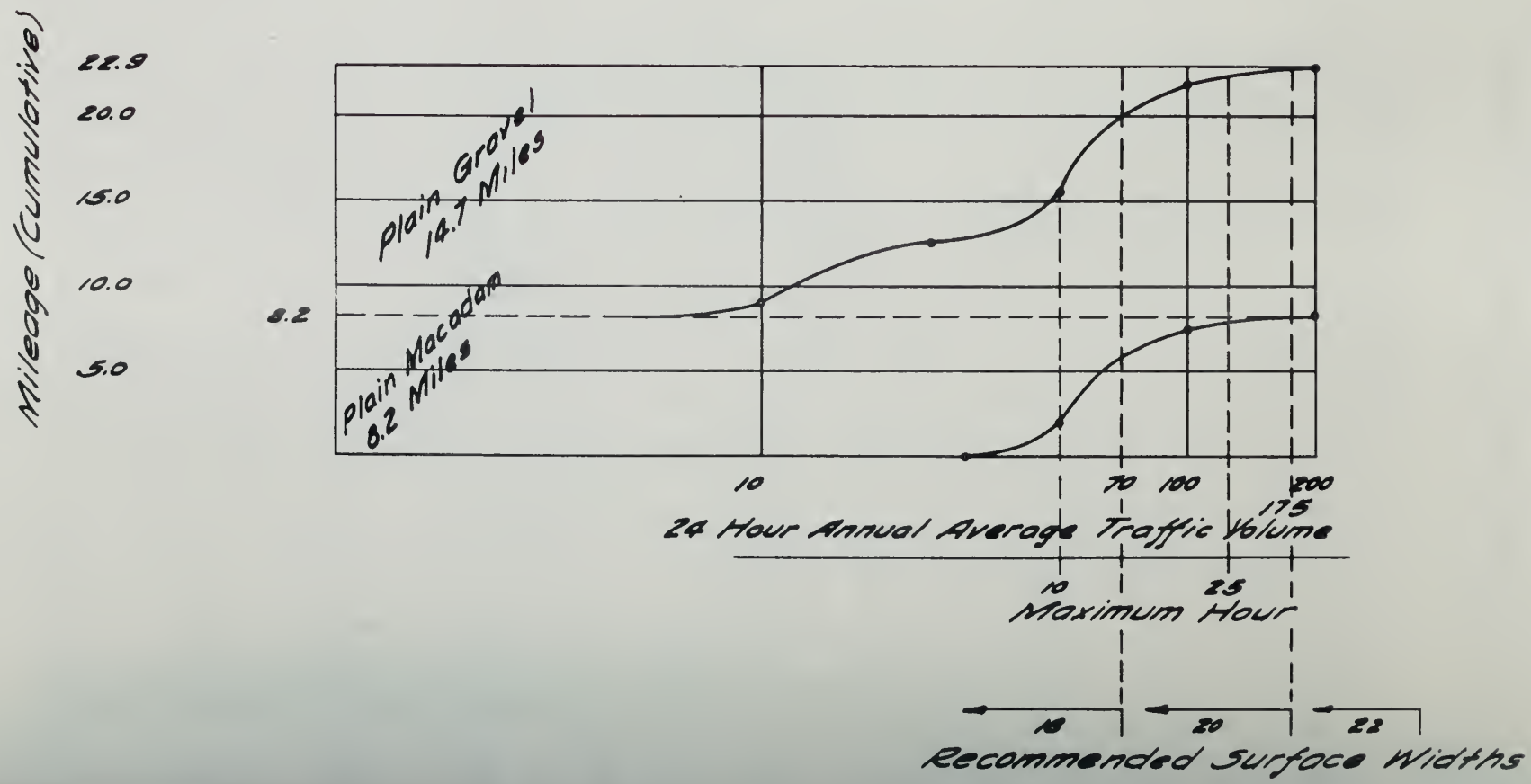


Plate XIX
State Secondary System
Showing Total Mileage Having
Surface Width of 16'-17'
Mileage (Cumulative)
Plain Macadam - 70.7 Miles
High Type Bitu-
minous - 35.1 Miles
Low Type Bitum-
inous - 0.8 Miles
24 Hour Annual Average Traffic Volumes
Maximum Hour
Recommended Surface Widths

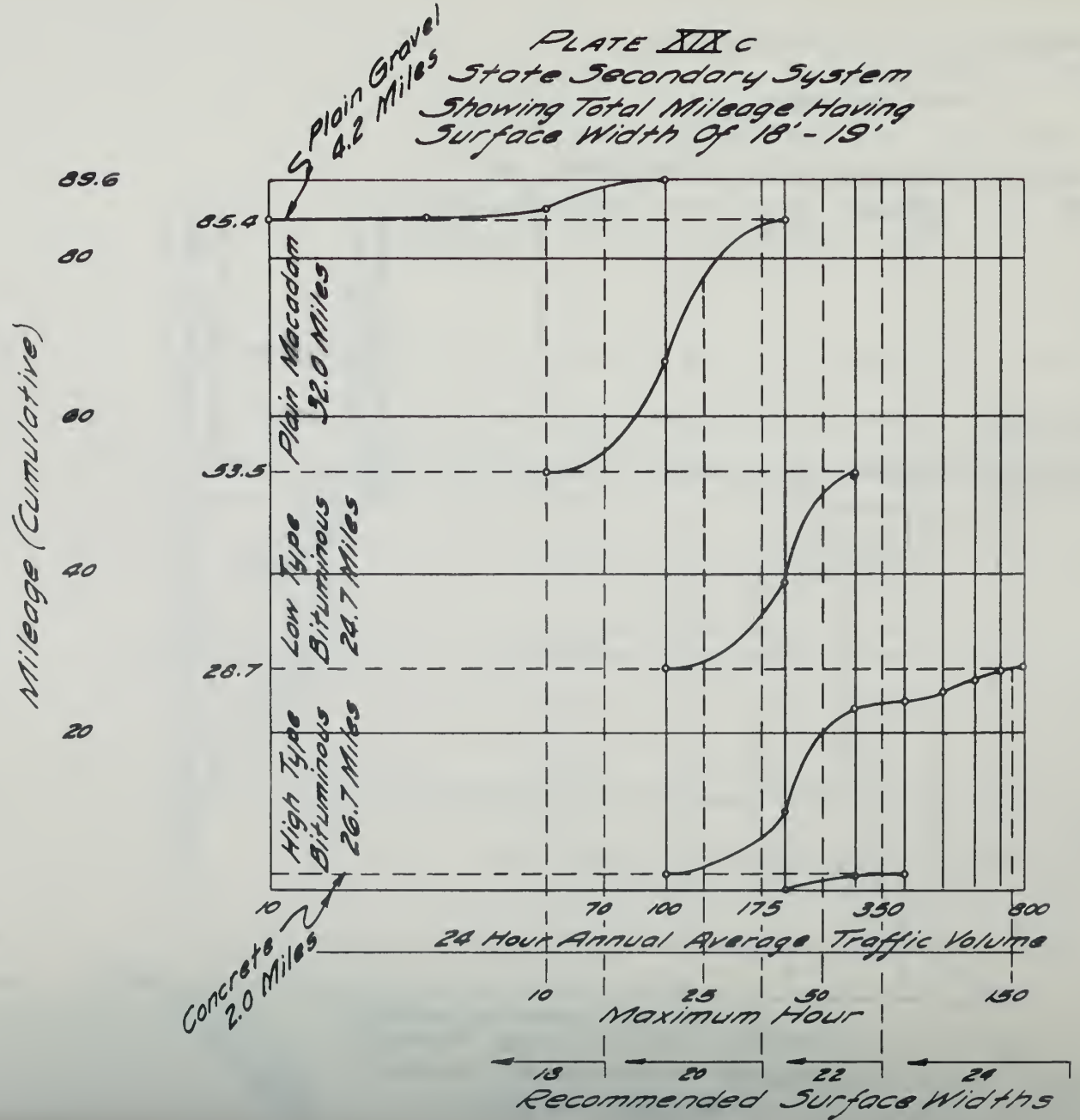


PLATE XIX C
State Secondary System
Showing Total Mileage Having
Surface Width Of 18' - 19'
Plain Gravel
4.2 Miles
Plain Macadam
32.0 Miles
Low Type
Bituminous
24.7 Miles
High Type
Bituminous
26.7 Miles
Concrete
2.0 Miles
89.6
85.4
60
33.5
28.7
40
20
Mileage (Cumulative)
10
70
100
175
350
800
24 Hour Annual Average Traffic Volume
10
25
50
150
Maximum Hour
13
20
22
24
Recommended Surface Widths

PLATE XIX D

State Secondary System Showing Total Mileage Having Surface Width Of 20'-21'

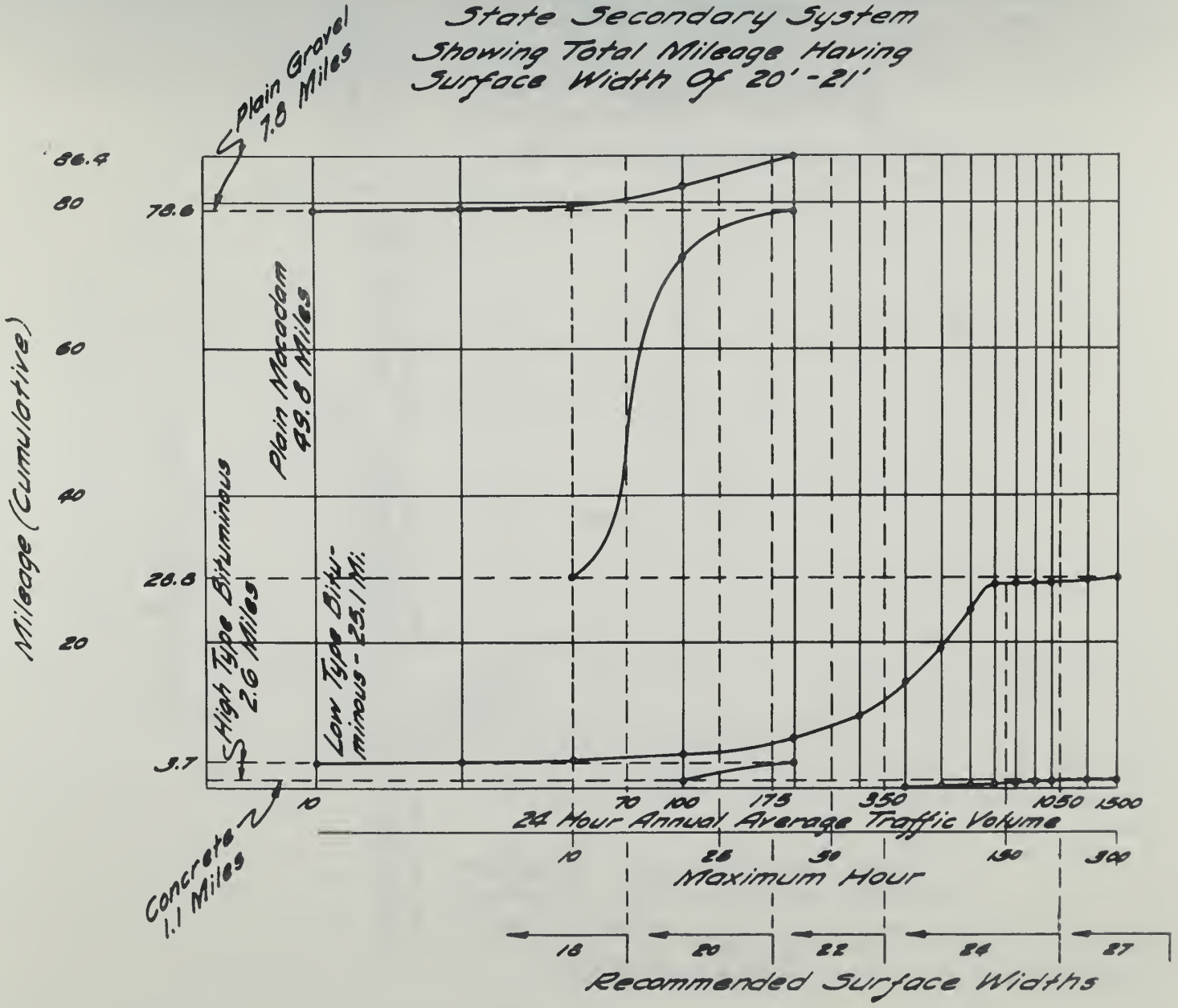


PLATE XXIX

State Secondary System
Showing Total Mileage Having
Surface Width Of 22'-23'

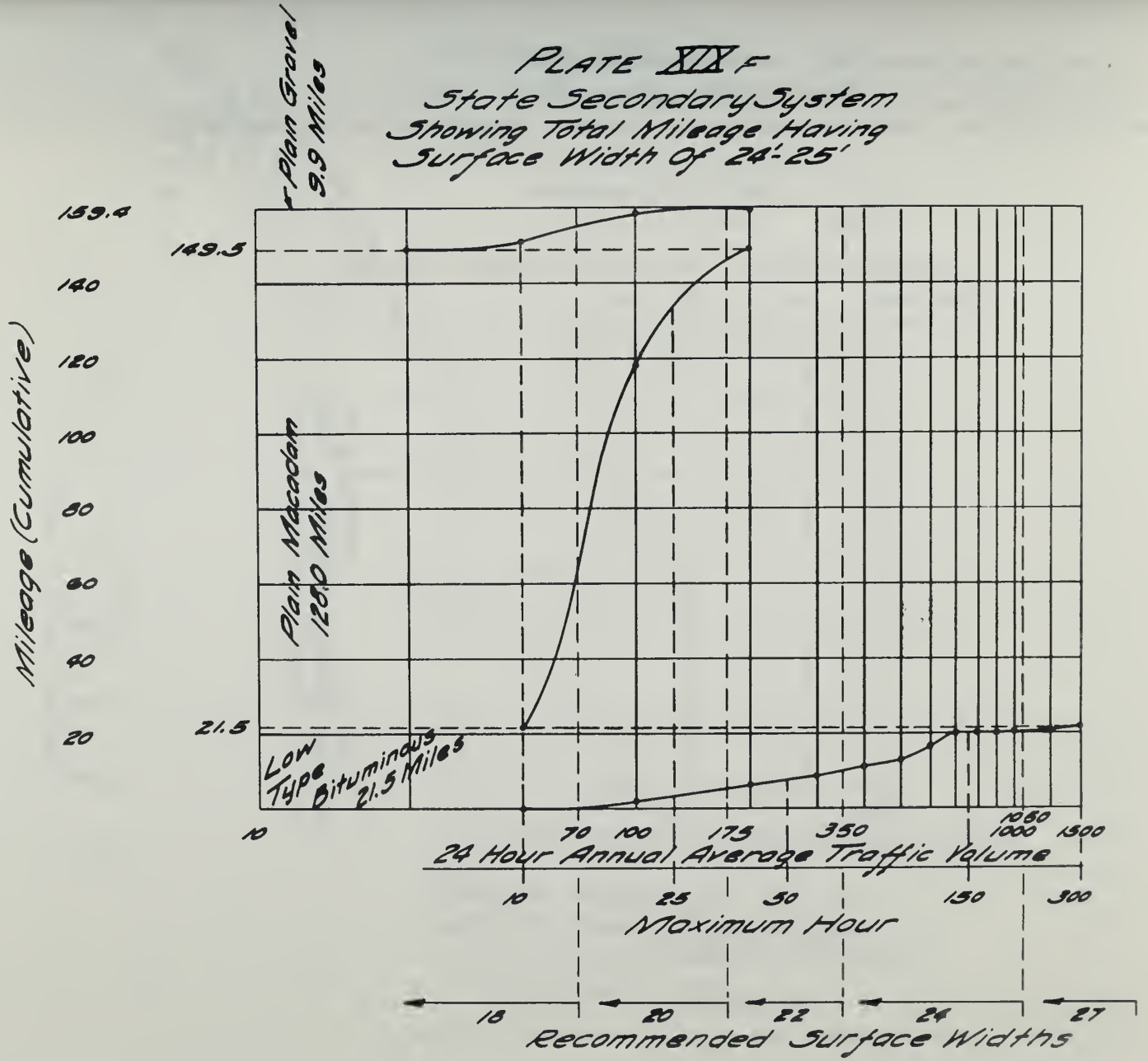


PLATE XIX F
State Secondary System
Showing Total Mileage Having
Surface Width of 24'-25'
Mileage (Cumulative)
159.4
149.3
140
120
100
80
60
40
21.5
20
Plain Gravel 9.9 Miles
Plain Macadam 127.8 Miles
Low Type Bituminous 21.5 Miles
10
70
100
175
350
1000
1500
24 Hour Annual Average Traffic Volume
10
25
50
150
300
Maximum Hour
18
20
22
24
27
Recommended Surface Widths

PLATE XIX G
State Secondary System
Showing Total Mileage Having
Surface Width Of 26'-27'
Mileage (Cumulative)
140
120
100
80
60
40
20
Plain Macadam
63 Miles
Plain Gravel
70 Miles
10
24 Hour Average Annual Traffic Volume
10
25
50
70
100
175
350
500
Maximum Hour
Concrete Miles
0.2 Peak Minutes
Low Type
0.5 Miles
18
20
22
24
Recommended Surface Widths

PLATE XIX H

State Secondary System

Showing Total Mileage Having Surface Width Of 28' & Over

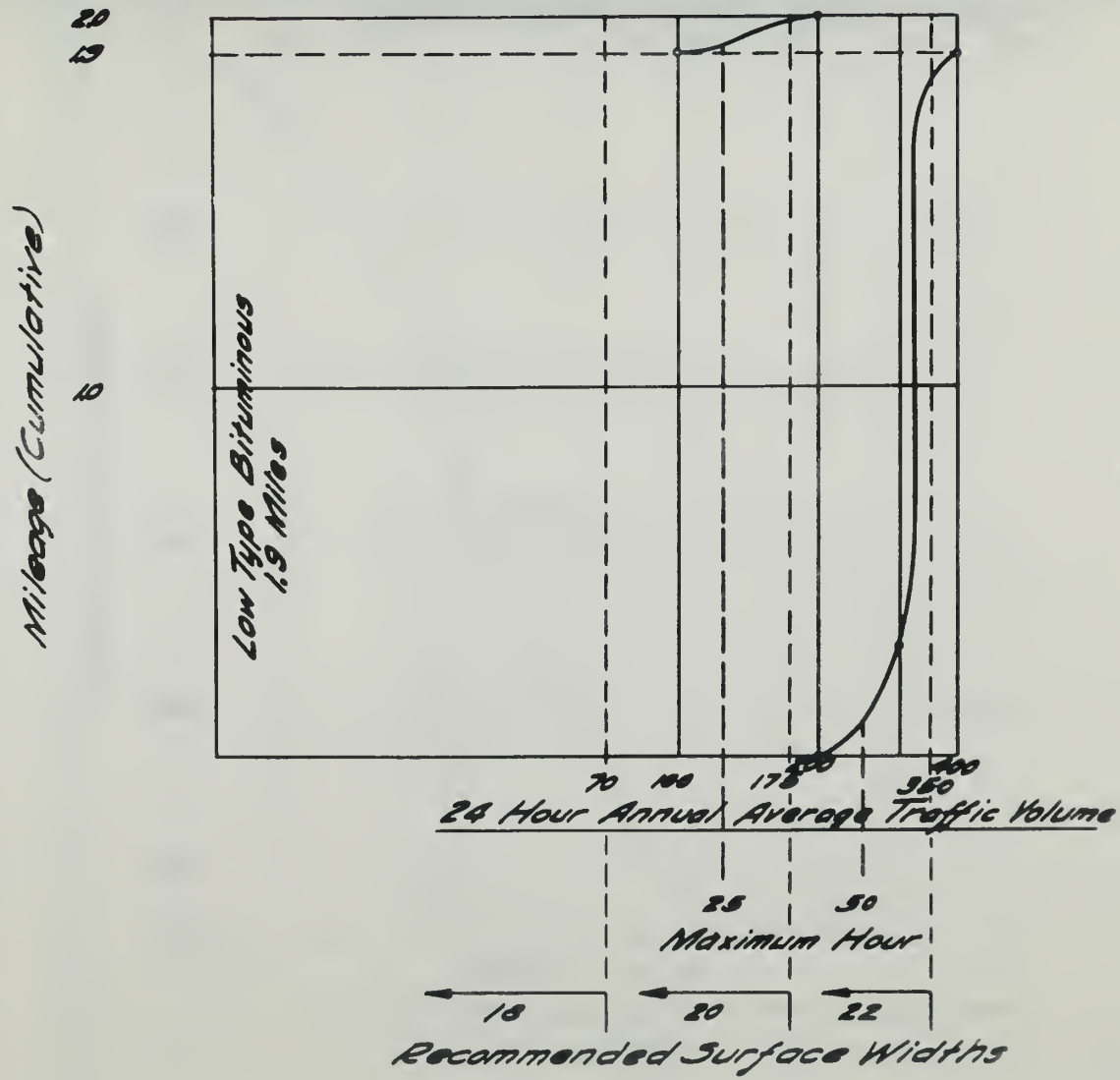
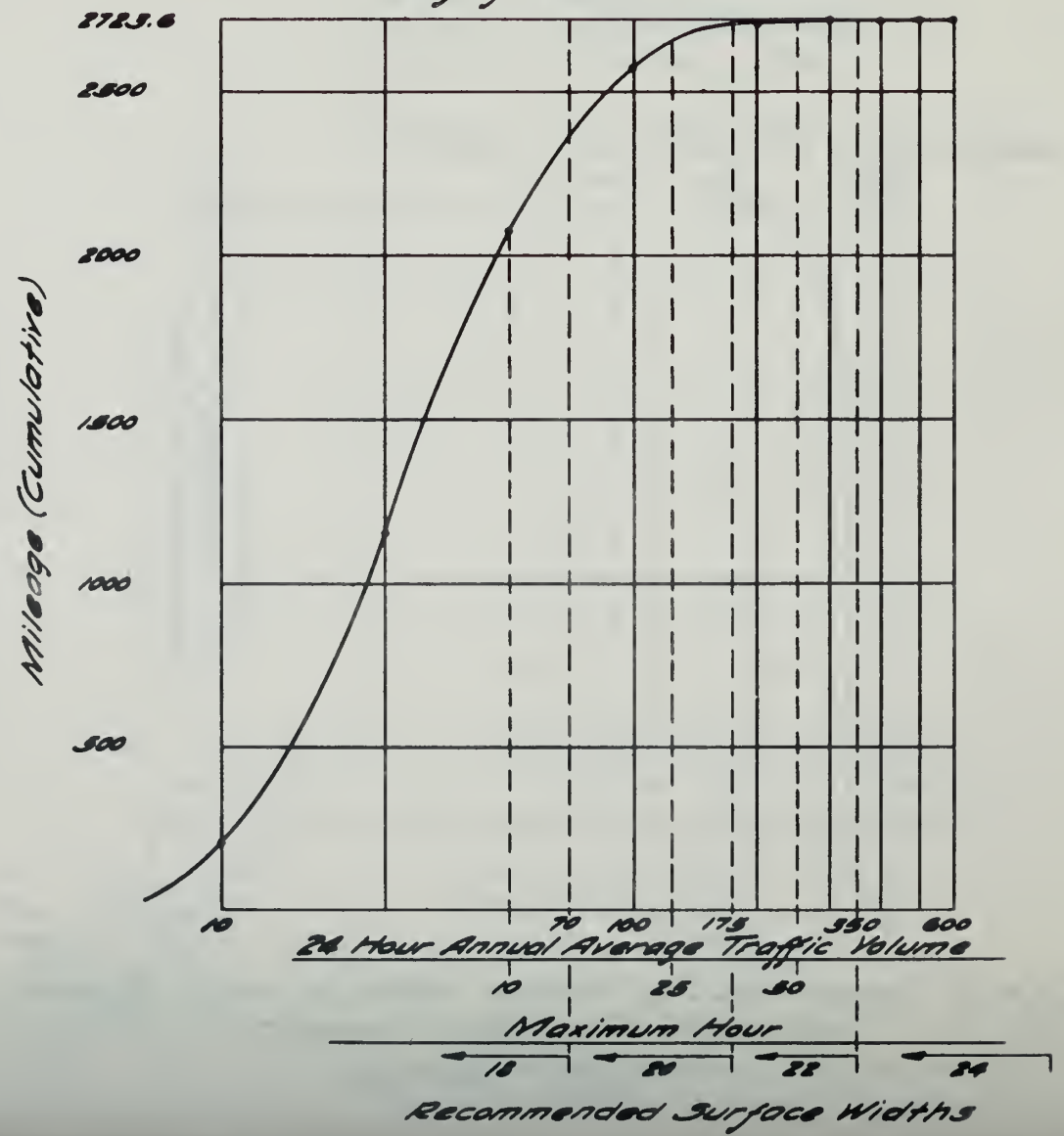


PLATE XIX I

Unimproved State Secondary System
Varying Widths



With data deriving from the foregoing tables and plates, it is found that the State Secondary System is inadequate in surface width generally as follows:

TABLE 52
Status of State Secondary System with Respect to Standards Developed in Chapter V

Surface Types	Existing Widths								All Widths	Recommended Surfaced Width						Status with Respect to Standards		
	Under 16	16-17	18-19	20-21	22-23	24-25	26-27	28 & Over		18	20	22	24	27	30	Below Standard	According to Standard	Design for Future Traf
Concrete			2.0	1.1			0.2		3.3			1.8	0.2 0.6 0.2	0.5		2.0 1.1		0.2
													1.8	1.0	0.5	3.1		0.2
High Type Bituminous		35.1	26.7	2.6					64.4		23.0 6.4 2.0	12.1 15.4 0.6	4.9			35.1 26.7 0.6	2.0	
											31.4	28.1	4.9			62.4	2.0	
Low Type Bituminous		0.8	24.7	25.1	28.9	21.5	0.5	1.9	103.4	0.3 0.8 0.6 2.2 0.9 0.1	0.4 8.0 2.4 10.1 4.6 0.3	0.1 16.7 5.5 16.6 4.6 0.1	16.0 10.4 1.1 0.8	0.6 1.0		0.8 24.7 22.1 16.6 1.0	2.4 10.1 10.4	0.6 2.2 10.1 0.5 1.9
										1.9	17.9	38.2	43.8	1.6		65.2	22.9	15.3
Plain Macadam	8.2	70.7	32.0	49.8	41.6	128.0	6.3		339.6	5.8 21.5 2.8 17.5 4.7 38.7 2.5	2.2 43.9 24.6 30.8 31.7 61.5 3.8	0.2 2.3 4.6 1.5 8.2 7.8	24.6			8.2 70.7 29.2 1.9 8.2	2.8 30.8	17.5 36.4 128.0 6.3
										96.5	218.5					109.6	41.8	188.2
Plain Gravel	14.7	0.4	4.2	7.8	4.4	9.9	7.0	0.1	48.5	11.8 0.3 2.4 1.9 0.7 4.6 4.3	2.7 0.1 1.8 4.8 3.0 5.2 2.6	0.2 0.1 1.1 0.7 0.1 0.1				14.7 0.4 1.8 1.1 0.7	2.4 4.8	1.9 3.7 9.9 7.0 0.1
										25.7	20.4	0.4				16.0	7.9	22.6
All Improved Types	22.9	107.0	69.6	86.4	77.9	159.4	14.0	2.0	559.2	17.6 24.8 5.2 20.0 5.4 44.2 6.9	4.9 67.6 40.8 40.0 36.9 91.3 6.7	0.4 14.6 38.5 8.7 19.0 12.5 0.2 1.2	5.1 16.6 16.6 10.4 0.2 0.8	1.1 1.0		22.9 107.0 84.4 26.4 16.6 1.0	5.2 40.0 19.0 10.4	20.0 42.3 148.0 14.0 2.0
										124.1	280.2	95.1	49.7	2.1		258.3	74.6	226.3
Unimproved									2723.6	2350.0	340.0	33.0	0.6			2723.6		
Total									3282.8	2474.1	628.2	128.1	50.3	2.1		3081.9	74.6	226.3

Continuing with the discussion we find surface width deficiencies as follows:

1. Concrete paving - 94% (3.1 miles) of the total mileage (3.3 miles) is inadequate, the balance (0.2 miles) is built to accommodate future traffic volumes.

2. High Type Bituminous - 97% of the total mileage is inadequate; 3% is built to satisfy the standards developed in Chapter V.

3. Low Type Bituminous - 63% of the total mileage is inadequate; 22% satisfies the demands of the standards advanced in Chapter V and 15% is built to accommodate estimated future traffic volumes.

4. Plain Macadam - 32% of the total mileage is lacking in width; 13% is constructed to the standards proposed and 55% is built to accommodate future traffic volumes.

5. Plain Gravel - 37% of the total mileage is lacking in width: 16% is built to standards consistent with those advanced in the preceding chapter and 47% is built to accommodate future traffic volumes.

6. Unimproved - The total length is deemed inadequate for obvious reasons of lack of engineering control in construction and maintenance.

6.02 Status With Respect to Standards of Curvature

A. Federal Aid System

Reconstruction and resurfacing recommends realignment and regrading as required to meet the standards regarding curvature as developed in Chapter V. Essentially, therefore, the discussion concerning surface widths comprehends the whole problem of future highway construction, since the surface as the ultimate consideration governs and controls the whole program through all phases of development. An adequate surfaced width would not be placed on a roadway deficient in alignment features, nor would it be placed on a roadway lacking in safe passing distances.

The Planning Survey procured data concerning curvature and sight distances on the Federal Aid System. These data have a limited value since curves 14° and over were considered critical in western Montana and 6° and over were considered critical in the eastern part of the state. The tables following present data respecting traffic density and pertinent features of alignment as follows:

TABLE 53
Traffic Density Classification of the Federal Aid System and Statement of Mileage Bearing Curvature in Excess of 14° and 6° in the Western District and the Eastern District Respectively.

Condition	Length Classification	Traffic Volume Groups																Total Length	Average Traffic
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	700 - 799	800 - 899	900 - 999	1000 - 1249	1250 - 1499	1500 - 1999	2000 - 2999		
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
Mountainous District (Western)																			
	Total Length		5.8	25.2	218.2	447.6	104.5	229.7	271.3	347.1	145.0	61.0	54.7	5.1	7.0	8.6	17.0	3.9	1951.7	360
Improved	Length Bearing Curvature in Excess of 14°			4.6	11.7	11.2	0.8	1.6	2.4	3.6	0.4	1.0	1.1	0.3	0.0	0.0	0.1	0.0	39.0	223
Unimproved	Total Length	27.6	74.5	3.2	152.4	30.9	0.2	0.1											288.9	55
Plains or Rolling District (Eastern)																				
Total Length	Total Length	5.2	39.3	33.9	193.7	525.1	822.4	424.2	270.8	231.2	79.5	51.6	37.7	5.4	2.0	1.5	2.9	2.3	2726.7	320
Improved	Length Bearing Curvature in Excess of 6°			0.6	3.6	26.3	8.7	18.0	7.6	3.0	4.7	0.3	0.7	0.4	0.6	0.1	0.2	0.2	75.2	319
Unimproved	Total Length		117.0	282.6	50.1														449.7	35

As stated hereinbefore, we have knowledge concerning the road mileage bearing curvature in excess of 6° in the non-mountainous district and 14° in the mountainous district. If we are to render a statement as to the status of existing curvature with respect to the tentative standards of curvature advanced in Chapter V, we must know the existing mileage bearing curvature in group intervals as follows:

Mountainous District	Non-mountainous District
Greater than 10° and less then 12°	Greater than 6° and less than 8°
" " 12° and " " 18°	" " 8° and " " 12°
" " 18° and " " 56°	" " 12° and " " 18°

By taking a sample of curve mileage on US2 in the mountainous district in Flathead and Lincoln Counties in increments of 2° from 10° to 56° we find the incidence of curve mileage to fall approximately along a curve represented by the equation

$$d' = \frac{dt'^2}{t^2} \qquad \text{where } d = \frac{t^2}{\Sigma t^2_{1---23}} = 12.23$$

where t' = Any group interval numbered consecutively by 2° decrements from 56° to 10°

where t = The twenty-third interval which in this case is the end point in the equation

where Σt^2_{1---23} = The sum of all the t'^2 from 1 through 22, plus t^2

Similar controls are in effect with respect to the non-mountainous district with the exception that there are 25 intervals from 56° to 6°.

No attempt is here being made to say that these equations are absolute as regards accuracy, they do, however, furnish a basis, in lieu of factual data not available at this time, upon which we may render an estimate as to the incidence of excess curvature on the Federal Aid System. Detailed computations concerning curve mileage are as follows:

Mountainous District

Curve Degree Classification	56°	54°	52°	50°	48°	46°	44°	42°	40°	38°	36°	34°	32°	30°	28°	26°	24°	22°	20°	18°	16°	14°	12°	
No. of Intervals (t')	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	t-23	
Squaring Unit Intervals (t'^2)	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256	289	324	361	400	441	484	t^2=529	4324-$\Sigma(t^2_{1...23})$
Percent of Total (d')	.02	.10	.21	.37	58	.83	1.13	1.48	1.87	2.31	2.80	3.33	3.91	4.53	5.21	5.92	6.66	7.50	8.35	9.25	10.20	11.19	d=12.23	100%
Percent Less Than (Cumulative)	100.00	99.9[illegible]	99.88	99.67	99.30	98.7[illegible]	97.89	96.76	95.28	93.41	91.10	88.30	84.97	81.06	76.53	71.32	65.40	58.72	51.22	42.87	33.62	23.42	12.23	
Mileage Less Than (Cumulative)	50.9	50.9	50.8	50.7	50.5	50.2	49.8	49.3	48.5	47.5	46.3	44.9	43.2	41.2	38.9	36.3	33.3	29.8	26.1	21.8	17.1	11.9	6.2	50.9

Non-Mountainous District

Curve Degree Classification	56°	54°	52°	50°	48°	46°	44°	42°	40°	38°	36°	34°	32°	30°	28°	26°	24°	22°	20°	18°	16°	14°	12°	10°	8°	
No. of Intervals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Squaring Unit Intervals	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256	289	324	361	400	441	484	529	576	625	5525
Percent of Total	.02	.07	.16	.29	.45	.65	.89	1.16	1.46	1.81	2.19	2.60	3.06	3.54	4.07	4.63	5.22	5.87	6.54	7.24	7.96	8.75	9.57	10.45	11.33	100%
Percent Less Than (Cumulative)	100.00	99.98	99.91	99.75	99.46	99.01	98.36	97.47	96.31	94.85	93.04	90.85	88.25	85.19	81.65	77.58	72.95	67.73	61.86	55.32	48.08	40.10	31.35	21.78	11.33	
Mileage Less Than (Cumulative)	75.2	75.2	75.1	75.0	74.8	74.5	74.1	73.3	72.5	71.5	70.0	68.4	66.4	64.1	61.4	58.4	54.9	50.9	46.6	41.6	36.2	30.2	23.6	16.4	8.5	75.2

PLATE XX A

FEDERAL AID SYSTEM - MOUNTAINOUS DISTRICT

Showing Mileage Bearing Excessive Curvature

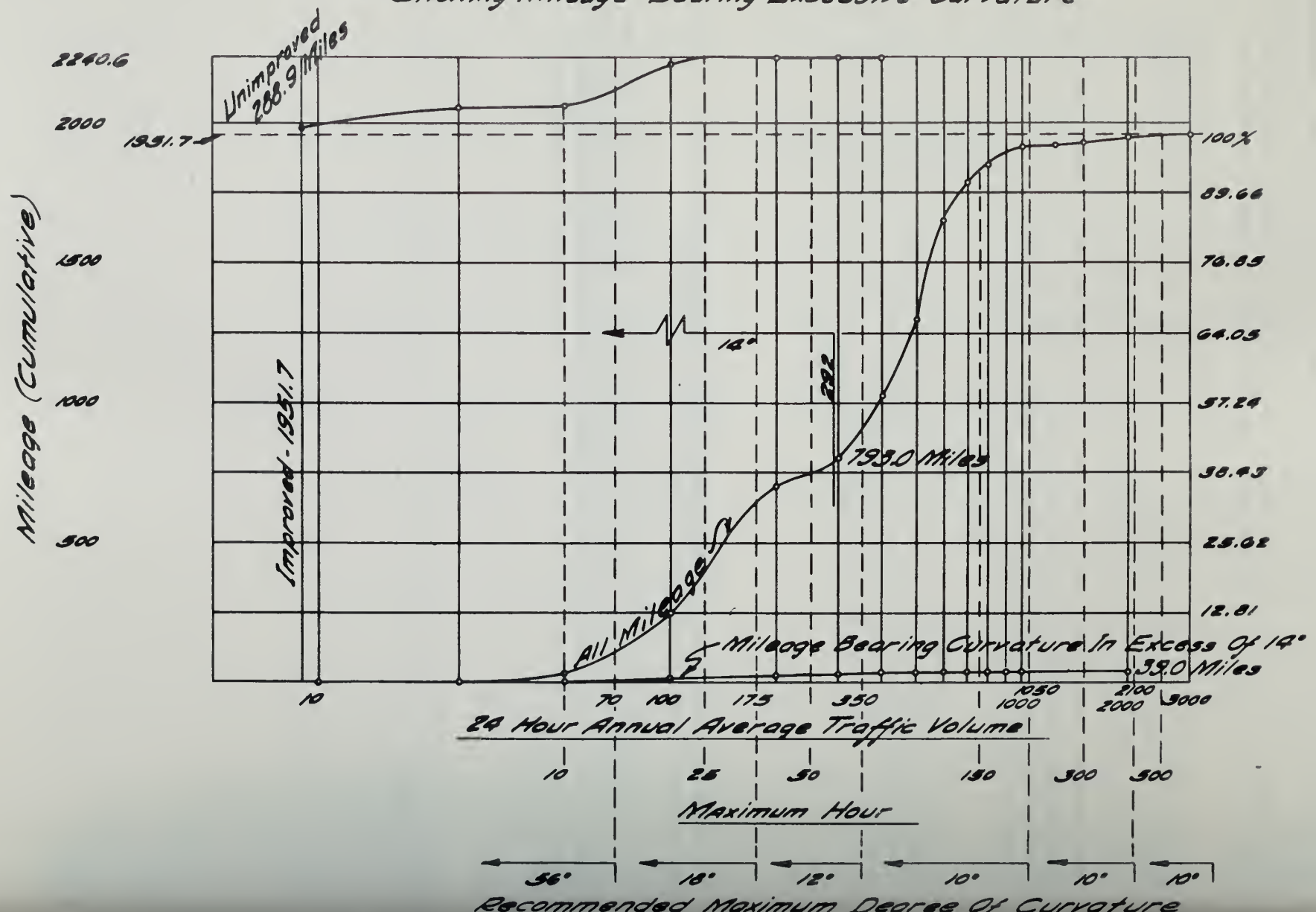
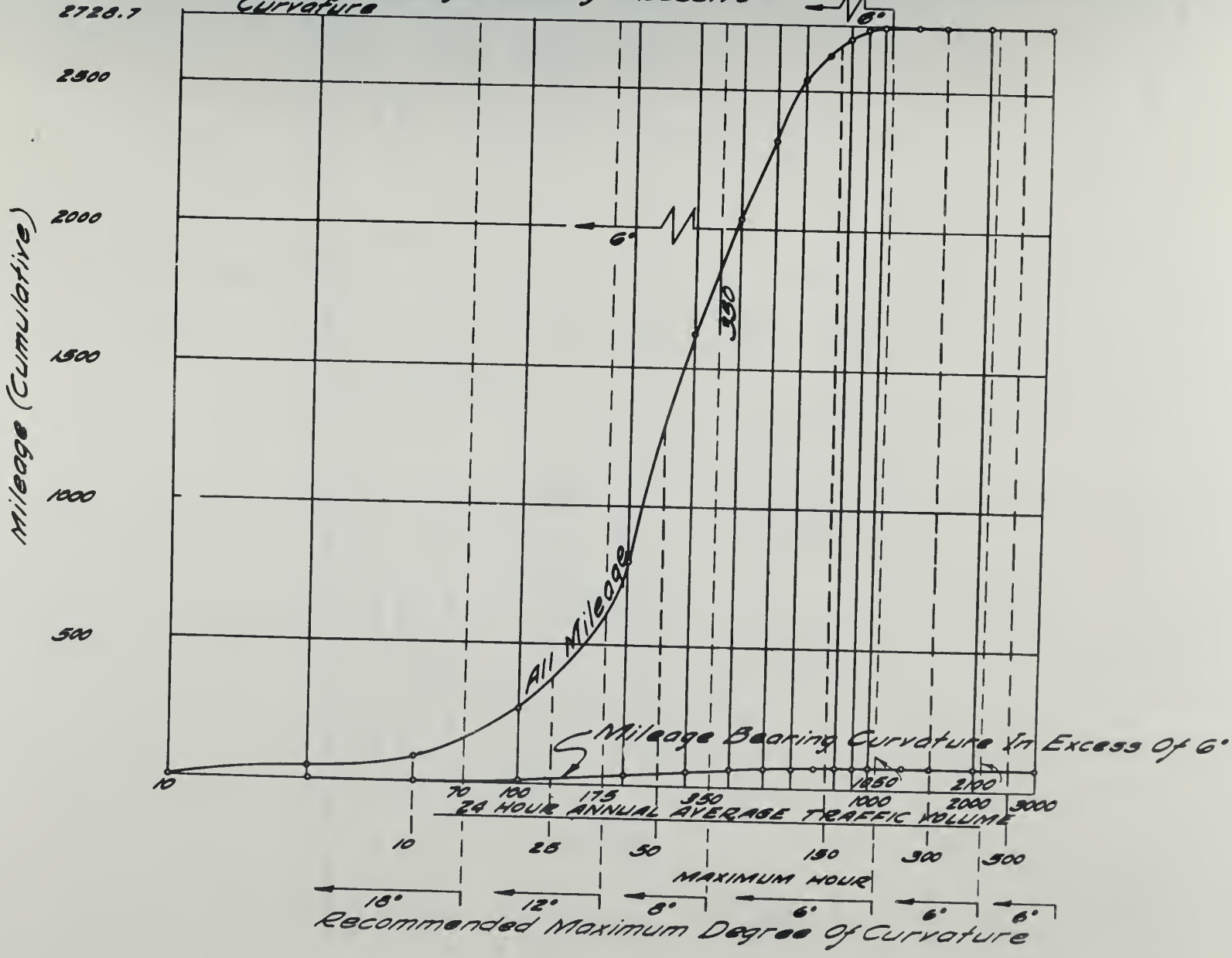


PLATE AA8

FEDERAL AID SYSTEM - NON-MOUNTAINOUS
Showing Mileage Bearing Excessive Curvature



Applying the mileage percentages apparent in the distribution, we find the system to exist as follows with respect to the standards advanced concerning features of alignment.

Mountainous District

Traffic volume Groups	Total mileage	Length Curvature Exceeding 14°	Length Curvature Exceeding 10°	Maximum Degree of Curvature to Replace	Below standard	According to standard	Design for future traffic
Less than 70	118.2	9.3	12.1	56°			12.1
70 - 174	467.0	15.4	20.1	18°	11.5	1.7	6.9
175 - 349	330.9	4.4	5.8	12°	5.1	0.7	
350 - 1049	1000.5	9.8	12.8	10°	12.8		
1050 - 2099	31.6	0.1	0.1	10°	0.1		
2100 - 3499	3.5			10°			
	1951.7	39.0	50.9		29.5	2.4	19.0

Non-mountainous District

Traffic Volume Groups	Total mileage	Length curvature exceeding 6°	Maximum degree of curvature to replace	Below standard	According to standard	Design for future traffic
Less than 70	155.9	2.1	18°	1.1	0.1	0.9
70 - 174	509.8	24.2	12°	16.9	1.6	5.7
175 - 349	1166.0	21.9	8°	18.3	1.7	1.9
350 - 1049	888.7	25.8	6°	25.8		
1050 - 2099	6.2	1.0	6°	1.0		
2100 - 3499	2.1	0.2	6°	0.2		
	2728.7	75.2		63.3	3.4	8.5

On review of Table 52, we find that 35.9 miles of the total mileage in the mountainous district bearing curvature in excess of 14° has previously been adjudged inadequate by reason of deficient width. Assuming similar distribution for all curvature over 10°, we would have 46.8 miles of the total in the mountainous district previously rendered inadequate as a circumstance of deficient width leaving 4.1 miles below standard and requiring reconstruction as function of re-alignment alone. These intervals would exist relatively as per the ratios and proportions set forth immediately herebefore, the county locale of such specific inadequacies being as follows:

County	Mileage	24 Hour Annual Ave. Tr. Volume	Maximum Degree of Curvature to Replace	Below Standard	According to Standard	Design for Future Traffic
	0.8	50	56°			0.8
Lincoln	0.1	199	12°	0.1		
	0.1	163	18°	0.1		
	0.7	126	18°	0.3	0.1	0.3
Cascade	0.5	101	18°	0.2	0.1	0.2
Lewis & Clark	0.1	103	18°	0.1		
Mineral	0.1	516	10°	0.1		
Sanders	0.1	298	12°	0.1		
	0.3	89	18°	0.2	0.1	
	0.1	67	56°			0.1
Meagher	0.2	69	56°			0.2
TOTALS	3.1			1.2	0.3	1.6

In general, any recommendations for reconstruction predicated on surface width considerations could not fail of improvement with respect to alignment.

In the eastern or non-mountainous district we find 61.0 miles of the total mileage bearing curvature in excess of 6° has been rendered inadequate by reason of deficient surface width, leaving 14.2 miles requiring reconstruction as a consequence of excessive curvature. Assuming similar distribution as that manifest in previous tabulations these intervals would be located as follows:

County	Mileage	24 Hour Annual Ave. Tr. Volume	Maximum Degree of Curvature to Replace	Below Standard	According to Standard	Design for Future Traffic
	6.3	134	12°	3.7	0.6	2.0
Glacier	0.2	188	8°	0.2		
Daniels	0.3	143	12°	0.2		0.1
Phillips	0.2	310	8°	0.2		
Roosevelt	1.6	266	8°	1.2	0.2	0.2
Dawson	1.0	270	8°	0.8	0.1	0.1
Prairie	0.3	288	8°	0.2	0.1	
Fergus	0.8	324	8°	0.6	0.1	0.1
Garfield	0.8	95	12°	0.5	0.1	0.2

County	Mileage	24 Hour Annual Ave. Tr. Volume	Maximum Degree of Curvature to Replace	Below Standard	According to Standard	Design for Future Traffic
Petroleum	0.2	65	18°		0.1	0.1
Cascade	0.5	256	8°	0.4	0.1	
Judith Basin	0.2	274	8°	0.1	0.1	
Pondera	0.1	111	12°	0.1		
Teton	0.3	78	12°	0.2	0.1	
Big Horn	0.9	285	8°	0.6	0.2	0.1
Golden Valley	0.1	121	8°	0.1		
Custer	0.4	149	8°	0.3	0.1	
TOTALS	14.2			9.4	1.9	2.9

Summarizing, we find 126.1 miles of improved roadway bearing curvature exceeding the critical limits established by the standards. By virtue of the distribution it is found, however, that only 92.8 miles are for all practical purposes below the standards as set forth and of this total 82.2 miles have been previously adjudged inadequate by reason of deficient surface width, the balance, 10.6 miles, would be recommended for reconstruction by reason of adverse curvature alone.

B. State Secondary System

The statement of the State Secondary mileage is as follows:

TABLE 54
Traffic Density Classification of the State Secondary System and Statement of Mileage Bearing Curvature in Excess of 14° and 6° in the Western District and the Eastern District Respectively.

Condition	Length Classification	Traffic Volume Groups														Total Length	Average Traffic
		0 - 9 Mi.	10 - 24 Mi.	25 - 49 Mi.	50 - 99 Mi.	100 - 199 Mi.	200 - 299 Mi.	300 - 399 Mi.	400 - 499 Mi.	500 - 599 Mi.	600 - 699 Mi.	700 - 799 Mi.	800 - 899 Mi.	900 - 999 Mi.	1000 - 1249 Mi.	1250 - 1499 Mi.	Mi.	
Mountainous District (Western)																	
	Total Length		0.7	2.2	60.4	72.3	38.1	5.7	11.2	4.2	1.6	0.6	0.3	0.2	0.6	0.5	198.6	199
Improved	Length Bearing Curvature in Excess of 14°			0.1	1.0	1.1	0.6	0.4	0.1	0.1	0.1	0.0	0.1				3.6	208
Unimproved	Total Length	69.1	175.7	368.0	206.3	26.7											845.8	59
Plains or Rolling District (Eastern)																		
	Total Length	0.8	3.5	8.9	208.1	97.7	5.6	12.8	4.1	11.0	6.1	0.5	0.2	0.2	0.6	0.5	360.6	132
Improved	Length Bearing Curvature in Excess of 6°	0.1	0.8	2.1	5.4	2.4	2.1	0.6							0.1		13.6	126
Unimproved	Total Length	138.2	766.2	558.8	291.4	118.3	2.4	0.9	0.7	0.9							1877.8	31

Assuming a similar distribution in curvature as that manifest in the Federal Aid System, we find results as follows:

Mountainous District

Curve Degree Classification	56°	54°	52°	50°	48°	46°	44°	42°	40°	38°	36°	34°	32°	30°	28°	26°	24°	22°	20°	18°	16°	14°	12°
Percent Less Than (Cumulative)	100.00	99.98	99.88	99.67	99.30	98.72	97.89	96.76	95.28	93.41	91.10	88.30	84.97	81.06	76.53	71.32	65.40	58.72	51.22	42.87	33.62	23.42	12.23
Mileage Less Than (Cumulative)	4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.6	4.5	4.4	4.3	4.2	4.0	3.8	3.6	3.4	3.1	2.8	2.4	2.0	1.6	1.1	0.6

Non-mountainous District

Curve Degree Classification	56°	54°	52°	50°	48°	46°	44°	42°	40°	38°	36°	34°	32°	30°	28°	26°	24°	22°	20°	18°	16°	14°	12°	10°	8°
Percent Less Than (Cumulative)	100.00	99.98	99.91	99.75	99.46	99.01	98.36	97.47	96.31	94.85	93.04	90.85	88.28	85.19	81.65	77.58	72.95	67.73	61.86	55.32	48.08	40.10	31.35	21.78	11.33
Mileage Less Than (Cumulative)	13.6	13.6	13.6	13.6	13.5	13.5	13.4	13.3	13.1	12.9	12.6	12.3	12.0	11.6	11.1	10.6	9.9	9.2	8.4	7.5	6.5	5.5	4.3	3.0	1.5

Resolving these data into a graphical presentation, we have results as follows:

PLATE XXI A

State Secondary System - Mountainous District

Showing Mileage Bearing Excessive Curvature

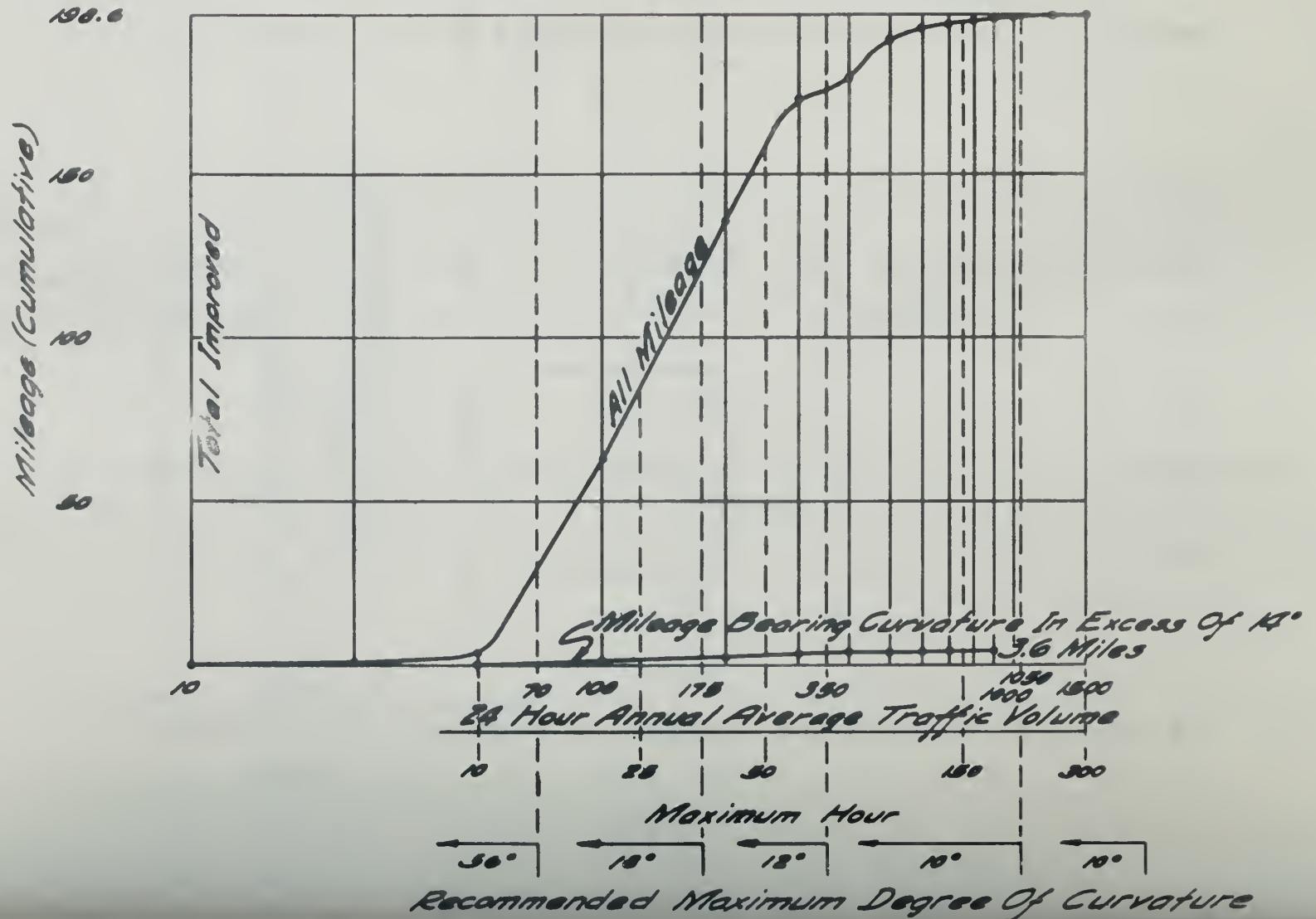
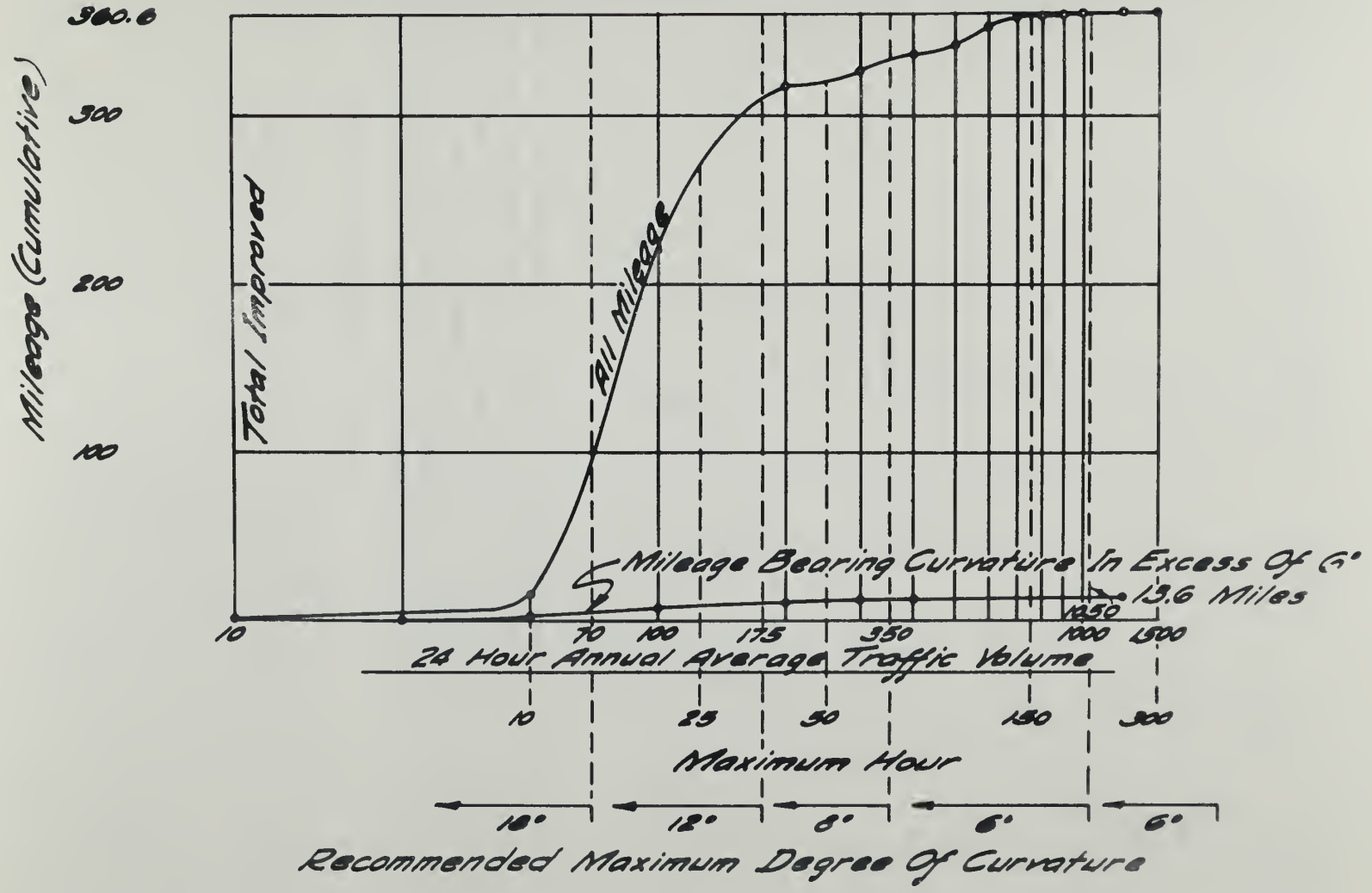


PLATE XXI B

State Secondary System - Non-Mountainous District

Showing Mileage Bearing Excessive Curvature



Applying the mileage percentages apparent in the distribution, we find the State Secondary System to exist as follows with respect to the standards advanced concerning maximum degree of curvature:

Mountainous District

Traffic Volume Groups	Total Mileage	Length Curvature Exceeding 14°	Length Curvature Exceeding 10°	Maximum Degree of Curvature to Replace	Below stan-dard	According to Standard	Desigr for Future Traffi
Less than 70	27.1	0.5	0.7	56°			0.7
70 - 174	90.5	1.4	1.8	18°	0.8	0.2	0.8
175 - 349	59.0	1.1	1.4	12°	1.2	0.2	
350 - 1049	21.0	0.6	0.8	10°	0.8		
1050 - 2099	1.0						
2100 - 3499							
	198.6	3.6	4.7		2.8	0.4	1.5

Non-mountainous District

Traffic Volume Groups	Total Mileage	Length Curvature Exceeding 6°	Maximum Degree of Curvature to Replace	Below. Standard	According to Standard	Desigr for Future Traffic
Less than 70	96.4	5.2	18°	2.0	0.3	2.9
70 - 174	198.2	5.0	12°	3.0	0.4	1.6
175 - 349	36.4	3.3	8°	2.6	0.3	0.4
350 - 1049	28.6	0.1	6°	0.1		
1050 - 2099	1.0					
2100 - 3499						
	360.6	13.6		7.7	1.0	4.9

Of the total mileage bearing curvature in excess of 14° in the mountainous district, 3.0 miles have been previously adjudged inadequate on the basis of deficient width leaving 0.6 miles requiring reconstruction and realignment alone. Assuming similar distribution for all curvature in excess of 10°, we have 3.9 miles previously rendered inadequate on the basis of deficient width and 0.8 miles requiring reconstruction as a function of realignment alone, these specific intervals being as follows:

Mountainous District

County	Mileage	24 Hour Annual Ave. Tr. Volume	Maximum Degree of Curvature to Replace	Below Standard	According to Standard	Designed for Future Traffic
Flathead	0.3	40	56°		0.1	0.2
Missoula	0.3	530	10°	0.3		
Beaverhead	0.1	95	18°	0.1		
Gallatin	0.1	97	18°	0.1		
	0.8			0.5	0.1	0.2

Of the total mileage in the eastern district bearing curvature in excess of 6° we find 4.2 miles have been adjudged inadequate on the basis of inadequate width leaving 9.4 miles inadequate as a circumstance of excessive curvature alone. Specific instances of the deficiencies qualified by probable incidence of adverse curvature are as follows:

Non-mountainous District

County	Mileage	24 Hour Annual Ave. Tr. Volume	Maximum Degree of Curvature to Replace	Below Standard	According to Standard	Designed for Future Traffic
	0.4	62	18°	0.2		0.2
Blaine	0.6	161	12°	0.3	0.1	0.2
Hill	0.5	120	12°	0.3		0.2
Toole	0.2	28	18°	0.1		0.1
Wibaux	0.1	90	12°	0.1		
	0.9	51	18°	0.3	0.1	0.5
Cascade	0.2	180	12°	0.1	0.1	
	0.2	48	18°	0.1		0.1
Chouteau	0.6	136	12°	0.3	0.1	0.2
	0.3	38	18°	0.1		0.2
Pondera	0.6	131	12°	0.3	0.1	0.2
Teton	0.3	45	18°	0.1	0.1	0.1
Sweet Grass	0.1	159	12°	0.1		
Carbon	0.1	32	18°	0.1		
Golden Valley	0.4	84	12°	0.2	0.1	0.1
	0.8	28	18°	0.3	0.1	0.4
Stillwater	1.5	290	8°	1.1	0.2	0.2
Treasure	0.3	65	18°	0.1	0.1	0.1
Carter	0.3	44	18°	0.1	0.1	0.1
Custer	0.4	66	18°	0.2	0.1	0.1
Rosebud	0.6	62	18°	0.3	0.1	0.2
Totals	9.4			4.8	1.4	3.2

Summarizing for the State Secondary System, we find 17.2 miles of improved highway alignment bearing curvature in excess of the critical limits set by the standards. As a consequence of the distribution of curvature it is found, however, that there are but 10.6 miles bearing excessive curvature, of which 5.3 miles had been previously adjudged inadequate as a consequence of deficient width, leaving 5.3 miles to be reconstructed as a result of adverse curvature alone.

603 Status with Respect to Standards of Sight Distance

A. Federal Aid System

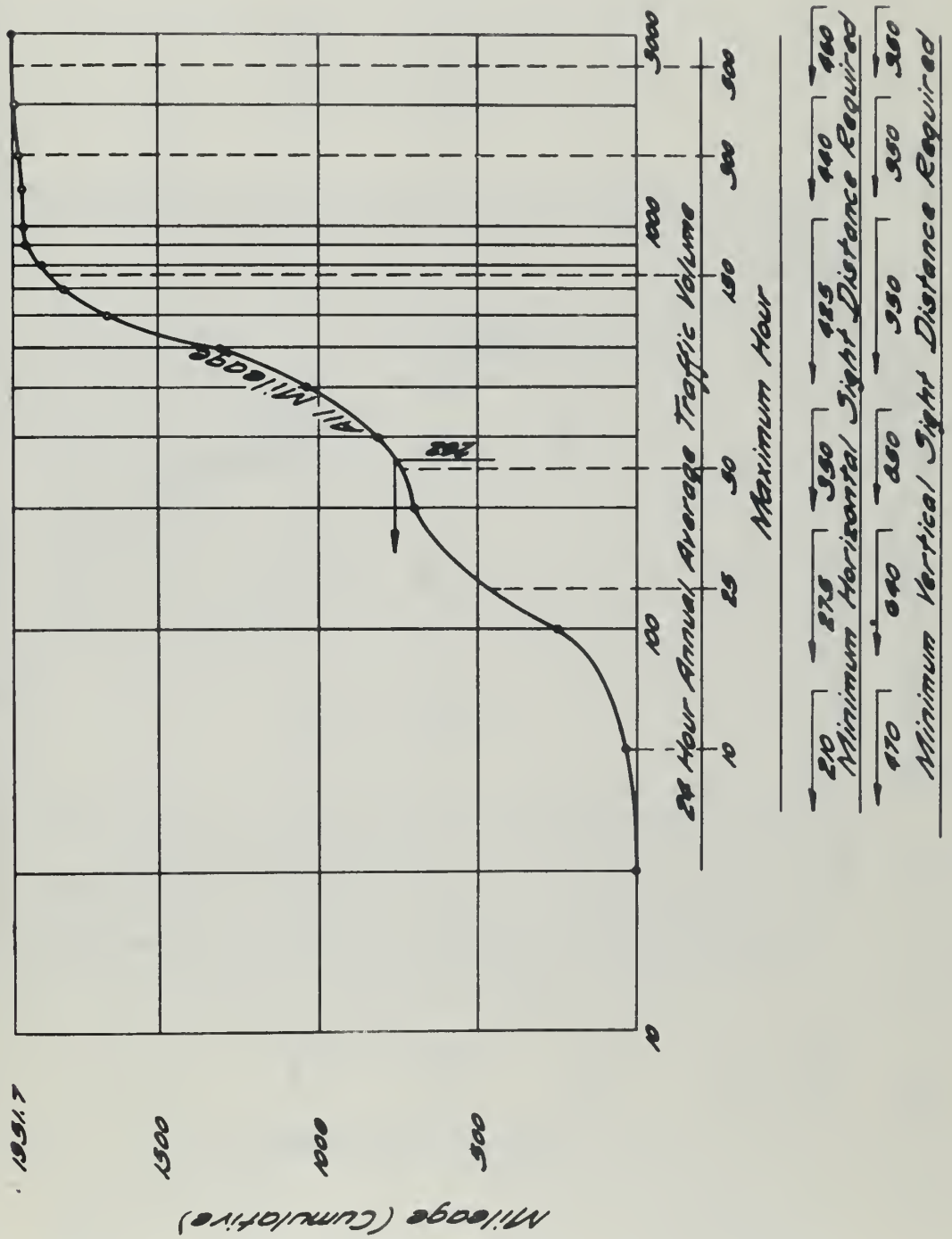
The Planning Survey procured data of limited value concerning restricted sight distances along the length of the Federal Aid System and improved sections of the State Secondary System. Since curvature and degree of curvature control, to a great extent, the incidence of sight restrictions, the outline in the previous section covers the question of excessive sight restriction in a small measure. Continuing the idea of transcending orders of reconstruction, we find that many of those sections listed as sub-standard as a consequence of restricted sights, were previously adjudged inadequate as a circumstance of excessive curvature and deficient width. The tabulation following presents detailed information with respect to the incidence of restricted sights on the Federal Aid System.

LEGEND:
Class 1 - Sights restricted to less than ⅔ minimum.
Class 2 - Sights restricted to less than minimum and more than ⅔ minimum.
Minimum Sights - Mountainous 625
Non-mountainous 1000

TABLE 55
Traffic Density Classification of the Federal Aid System and Distribution of Restricted Sights.

Condition	Classification	Traffic Volume Groups 0 - 9 Mi.	10 - 24 Mi.	25 - 49 Mi.	50 - 99 Mi.	100 - 199 Mi.	200 - 299 Mi.	300 - 399 Mi.	400 - 499 Mi.	500 - 599 Mi.	600 - 699 Mi.	700 - 799 Mi.	800 - 899 Mi.	900 - 999 Mi.	1000 - 1249 Mi.	1250 - 1499 Mi.	1500 - 1999 Mi.	2000 - 2999 Mi.	Total Length Mi.
	Mountainous Areas																		
	Total Length		5.8	25.2	218.2	447.6	104.5	229.7	271.3	347.1	145.0	61.0	54.7	5.1	7.0	8.6	17.0	3.9	1951.7
	Mileage bearing curveture in excess of 14°			4.6	11.7	11.2	0.8	1.6	2.4	3.8	0.4	1.0	1.1	0.3			0.1		39.0
	Mileage bearing curvature in excess of 14° and coincident with sight restrictions			4.6	11.7	11.1	0.7	1.4	2.4	2.9	0.4	0.9	1.1	0.1			0.1		37.4
	Class 1-Sight restrictions coincident with excessive curvature (Number of)				360	153	32	30	20	57	3	6	19				1		681
	Class 2-Sight restrictions coincident with excessive curvature (Number of)			53	176	204	50	71	43	70	30	20	31	1	2	3	3		759
	Class 1-Sight restrictions not coincident with excessive curvature (Number of)			33	44	35	3	26	32	30	2	24	4	4	2	1			240
	Class 2-Sight restrictions not coincident with excessive curvature (Number of)			50	272	233	82	206	195	170	25	135	23	12	10	1	5	0	1427
	Sub-Total Class 1 (Number of)			33	404	188	35	56	52	87	5	30	23	4	2	1	1		921
	Sub-Total Class 2 (Number of)			103	450	437	132	277	238	240	55	155	54	13	12	4	8	8	2186
	Sub-Total restrictions coincident with curveture (Number of)			53	538	357	82	101	63	127	33	26	50	1	2	3	4		1140
	Sub-Total restrictione not coincident with curveture (Number of)			83	316	268	85	232	227	200	27	159	27	16	12	2	5	8	1667
Improved	All restrictions (Number of)			136	854	625	167	333	290	327	60	185	77	17	14	5	9	8	3107
	Non-mountainous Areas																		
	Total Length	5.2	39.3	33.9	193.7	525.1	822.4	424.2	270.8	231.2	79.5	51.6	37.7	5.4	2.0	1.5	2.9	2.3	2728.7
	Mileage bearing curvature in excess of 6°			0.6	3.8	26.3	8.7	18.0	7.6	3.0	4.7	0.3	0.7	0.4	0.6	0.1	0.2	0.2	75.2
	Mileage bearing curvature in excess of 6° and coincident with sight restrictions			0.6	3.5	26.1	7.6	17.9	7.5	2.2	4.0	0.3	0.7	0.3	0.6	0.1	0.2	0.1	71.7
	Class 1-Sight restrictions coincident with excessive curvature (Number of)			8	27	276	71	200	82	51	30	1		1	14	1	1	3	766
	Class 2-Sight restrictions coincident with excessive curvature (Number of)			18	42	378	105	298	131	53	28	10	1	6	5	1	1	4	1081
	Class 1-Sight restrictions not coincident with excessive curveture (Number of)		3	10	21	113	13	45	14	8	18	3	2				1		251
	Class 2-Sight restrictions not coincident with excessive curvature (Number of)	7	21	36	199	528	119	176	56	78	14	19		1	1	2	4	4	1265
	Sub-Total Class 1 (Number of)		3	18	48	389	84	245	96	59	48	4	2	1	14	1	2	3	1017
	Sub-Total Class 2 (Number of)	7	21	54	241	906	224	474	187	131	42	29	1	7	6	3	5	8	2346
	Sub-Total restrictions coincident with curvature (Number of)			26	69	654	176	498	213	104	58	11	1	7	19	2	2	7	1847
	Sub-Total restrictions not coincident with curvature (Number of)	7	24	46	220	641	132	221	70	86	32	22	2	1	1	2	5	4	1516
Improved	All restrictions (Number of)	7	24	72	289	1295	308	719	283	190	90	33	3	8	20	4	7	11	3363

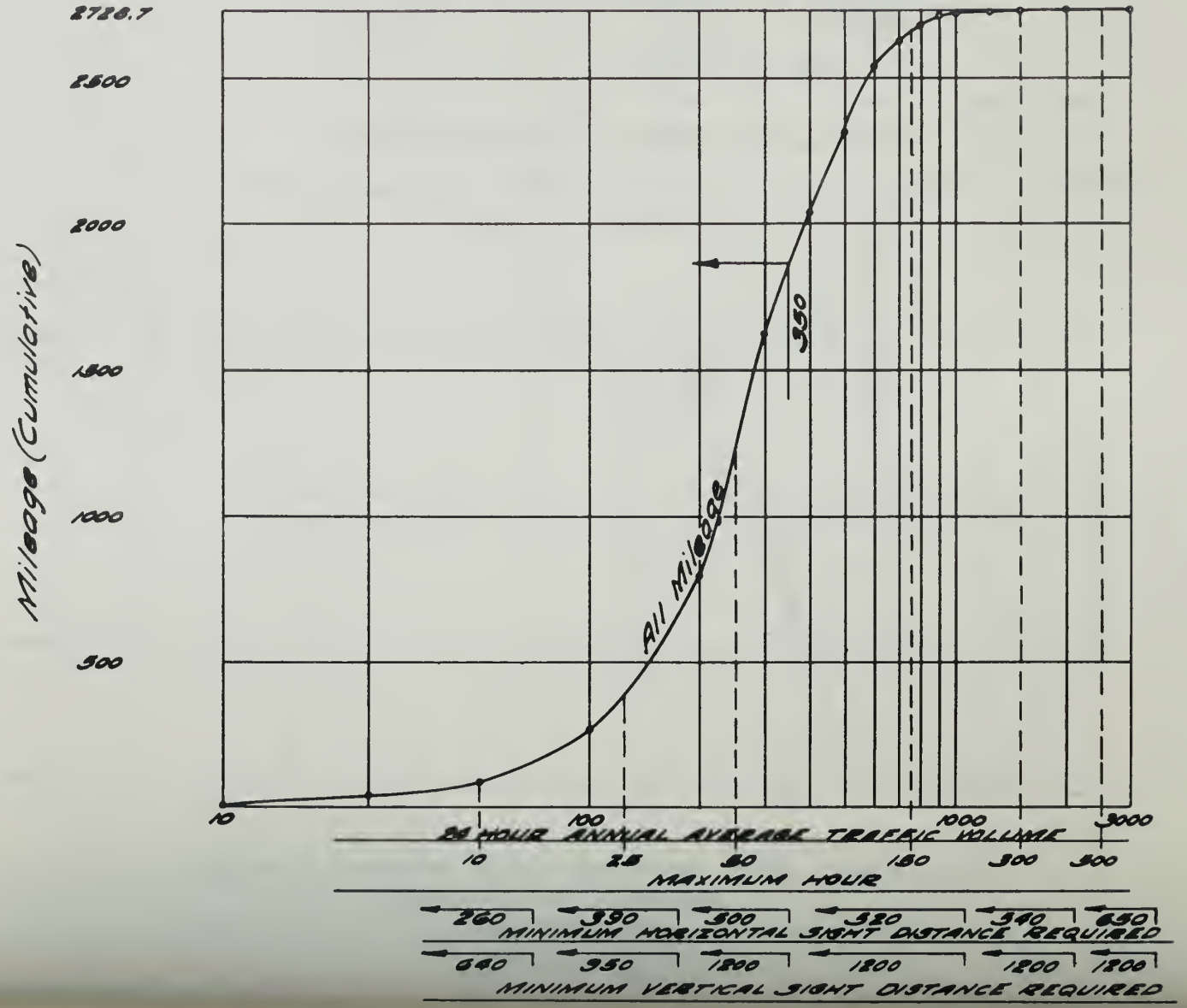
These data when resolved into graphs, present information as follows:



FEDERAL AID SYSTEM- NON-MOUNTAINOUS

PLATE XXII B

Showing Mileage With Excessive Sight Impairment



CHAPTER VII

APPLICATION OF RESULTS OF ROAD LIFE STUDIES TO EVALUATION OF ROAD PLANT

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VII

APPLICATION OF RESULTS OF ROAD LIFE STUDIES TO EVALUATION OF ROAD PLANT

Road life studies afford an approach to a quantitative determination of the service life of the several surface types now extant. There are two general limiting factors which affect the average service life, these being structural deterioration and functional obsolescence. Evidence of these two factors is found in the retirements recorded during the period covered by the study. When these retirements accumulate to the extent that the original construction is retired in its entirety, the summation of the mile years of service divided by the original construction length, in miles will give the average service life. In cases where the total retirement has not yet been experienced but where the experience is sufficient to establish a trend or tendency, we are enabled to estimate the probable future life of any surface type by use of "stub survivor curves". The derivation of these "stub survivor curves" is described by Professor Robley Winfrey in Bulletin 125, Iowa Engineering Experiment Station, entitled "Statistical analysis of Industrial Property Retirements."

An intelligent evaluation of the State Highway System requires specific knowledge concerning its status at present, and the probable future life of the surface types now in place. As the system approaches initial completion this consideration achieves greater importance, since to allocate funds for any program we must know how much to apportion to initial construction, and how much to reconstruction. It is conceivable that the demands of reconstruction will hamper further construction on extensions of the Federal Aid System; this is particularly true should the State Highway Department be required to render assistance on the construction of a comprehensive system of feeder or secondary highways.

Results achieved through furtherance of the study will present data affording a tenable basis for predicting service life, particularly so in those states which have had a relatively long term of highway "experience". Montana's experience with surfacing types is of comparatively recent origin and the service life of each of several surface types is influenced by a multiplicity of factors not wholly related to deterioration and obsolescence. For example, we might cite the statutory method of setting up financial districts in the state as a limiting factor in service life since in some cases allocations might be so exhausted as to allow grading only on a construction project. Funds might then accumulate in the district to allow surfacing at some immediate later date. In this case the earth surface was not retired by reason of deterioration or obsolescence, it was retired for the reason that moneys were made available to provide improved highway facilities. Another contributing factor akin to that cited above, is the program of stage construction whereby each successive surface type construction is allowed to "cure" before applying the next treatment. Here each surface type is allowed to survive for a limited period under observation and is retired solely as a function of progressive practical construction. On the other hand, some surfaces are allowed to remain in service for a longer period than their economical service life would warrant. Such a condition would occur in a case where mounting maintenance costs would exceed a recapitalization afforded through reconstruction. There are no definitive data to support the above statements, but the opinion prevails that such a condition can and does exist.

Obsolescence as a limiting factor in service life enters as a consequence of progressive improvements in motor vehicle design. The degree of obsolescence is apparent by comparison of standards, that is to say, the standards of alignment, surface width, sight distance, etc. should theoretically accommodate contemporary values of traffic at increasing speeds. If this condition does not exist, the road is rendered obsolete and on reconstruction the surface type would be retired by reason of obsolescence.

These factors entering into the consideration of service life along with others, have influenced the average age and measure of survival to a point whereby any predictions of future life are general rather than conclusive at the present time. It

is to be noted also that the results of the Road Life Study to date are indicative not only of service life values but also of tendencies or trends in Montana highway construction procedure in that a certain constancy is obtained for all the several surface type ages to indicate a measure of success in progressive stage construction.

This is indicated from the data given in Table 56-A and Table 56-B. Table 56-A shows in the year 1937, that 25 miles of the 26 miles constructed that year were retired. From this date on, a large percentage of all mileage that had graded and drained construction were retired the following year. In Table 56-B, beginning with the year 1927, a large mileage of the roads that were graveled were retired the following year. This can be explained by looking at Table 56-C which shows that low type bituminous construction was first inaugurated in 1928. This table also shows that very late low type bituminous roads were retired in one or two years. The majority of the mileage was still in existence in 1936. The same statement holds true for Table 56-D which covers high type bituminous surfacing.

The trends in evidence are of value now and in the near future for the reason that some of the surfaces now in use should survive through the period of construction flux ending with ultimate initial completion of the system. It is entirely conceivable that the same considerations of financial urgency and expediency will exist in the future as in the past, hence the Road Life Study should afford information of considerable value with respect to economical practices in maintaining the highway status quo.

In summary, this discussion has attempted clarification of the objectives of the Road Life Study. The discussion has been advanced also to emphasize the necessity for the continuance of the study. The problem has been presented and certainly the procedures outlined herein afford a convenient tool to analyze the questions faced by highway builders and administrators in matters relating to economic service life.

7.01--Tangible Factors Influencing Economical Service Life

The program of improvement by surface type during the period beginning 1919 and ending in 1936 is as follows: (No data are given concerning concrete paving since this type exists in a satisfactory state from the standpoint of durability and further it is not probable that additional concrete will be laid in years to come.)

These data were prepared prior to the time that the Road Life Study has been organized in great detail. For more complete information the reader is referred to the Report of the Montana Planning Survey concerning Road Life Studies.

Table 56A

SHOWING MILES OF GRADED AND DRAINED ROADS CONSTRUCTED ON THE PRIMARY SYSTEM AND SURVIVING MILEAGE

Constructed		Surviving Mileage - July 1																	Average Service Life And Average Age De	
Fiscal Year Ending June 30	Miles Cumulative	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	Service life	Age of Mileage Servi July 1,
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.		
1919	34	34	34	34	34	34	34	34	34	21	19	13	10	10	10	4	0	0	0	10.5	17.5
1920	47		12	12	12	12	12	12	12	12	5	5	4	4	4	4	4	0	0	10.1	16.5
1921	153			116	108	108	108	108	108	108	108	108	108	64	64	45	38	37	36	20.0	15.5
1922	169				6	6	6	6	4	4	4	4	1	0	0	0	0	0	0	7.3	14.5
1923	222					33	33	33	33	33	33	33	33	22	22	22	22	22	22	10.0	13.5
1924	249						27	26	23	23	23	23	23	23	23	23	23	23	23	10.9	12.5
1925	263							16	5	5	4	4	4	4	4	4	4	4	4	1.7	11.5
1926	316								15	12	12	12	4	4	4	4	4	4	4	2.4	10.5
1927	346									26	1	1	1	1	1	1	0	0	0	2.4	9.5
1928	529										194	97	58	51	43	13	13	13	13	2.4	8.5
1929	937											337	285	45	9	0	0	0	0	1.1	7.5
1930	1247												295	129	71	40	40	31	30	2.0	6.5
1931	1440													166	70	21	18	18	18	1.6	5.5
1932	1612														106	45	29	29	7	1.6	4.5
1933	1744															113	95	41	40	2.0	3.5
1934	1806																61	53	11	1.9	2.5
1935	1842																	37	17	1.3	1.5
1936	1918																		73	0.5	0.5
Total Surviving		34	46	162	160	193	220	235	234	244	403	637	826	523	497	339	351	312	298	2.9	7.35

Table 56B

SHOWING MILES OF GRAVELED ROADS
ON THE PRIMARY SYSTEM
AND SURVIVING MILEAGE

Constructed		Surviving Mileage July 1 -																Average Service Life or Average Age Data	
Fiscal Year Ending June 30	Miles cumulative	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	Service Life	Age of Mileage in Service July 1, 1936
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.		
1920	90	90	90	90	84	84	84	71	71	68	54	54	48	36	22	17	17	8	10.0	14.5
1921	374		284	284	284	283	283	249	242	242	192	140	127	93	73	53	50	47	10.2	14.5
1922	528			154	154	154	154	150	148	145	145	136	122	100	100	77	70	33	11.9	14.5
1923	575				36	36	36	36	36	36	36	33	4	4	4	0	0	0	6.3	13.5
1924	765					190	190	185	185	181	177	177	160	149	145	85	32	24	9.8	12.5
1925	867						122	122	122	122	122	122	102	95	89	49	35	14	9.1	11.5
1926	1104							217	217	205	187	169	167	114	97	56	39	6	6.8	10.5
1927	1285								181	177	170	144	120	108	96	36	36	18	6.0	9.5
1928	1499									212	209	204	197	168	150	130	115	54	6.6	8.5
1929	1862										363	334	253	151	106	51	44	13	3.6	7.5
1930	2080											218	142	118	112	69	31	3	3.2	6.5
1931	2934												811	637	509	291	206	85	2.9	5.5
1932	3375													417	331	204	102	2	2.4	4.5
1933	3839														430	239	139	15	1.8	3.5
1934	4235															260	209	39	1.2	2.5
1935	4368																1.9	0	0.8	1.5
1936	4448																	07	0.4	0.5
		90	374	528	558	747	869	1030	1202	1338	1655	1731	2253	2190	2264	1617	1234	428	4.5	7.2

Table 56C

SHOWING MILES OF ROADWAY BEARING LOW TYPE BITUMINOUS
ON THE PRIMARY SYSTEM
SURFACING AND SURVIVING MILEAGE

Constructed		Surviving Mileage - July 1										Age of Mileage in Service July 1, 1936
Fiscal Year Ending June 30	Miles	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	
		Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	
1927	0	0	0	0	0	0	0	0	0	0	0	0.0
1928	4		4	4	4	4	4	4	2	2	2	8.5
1929	17			13	13	13	13	13	7	7	7	7.5
1930	31				14	14	14	14	14	14	14	6.5
1931	107					76	76	69	67	54	50	5.5
1932	392						285	284	271	271	261	4.5
1933	643							251	247	247	246	3.5
1934	1420								777	750	748	2.5
1935	1781									361	361	1.5
1936	2669										888	0.5
		0	4	17	31	107	392	635	1385	1706	2577	21.4

PLATE XXIII - A

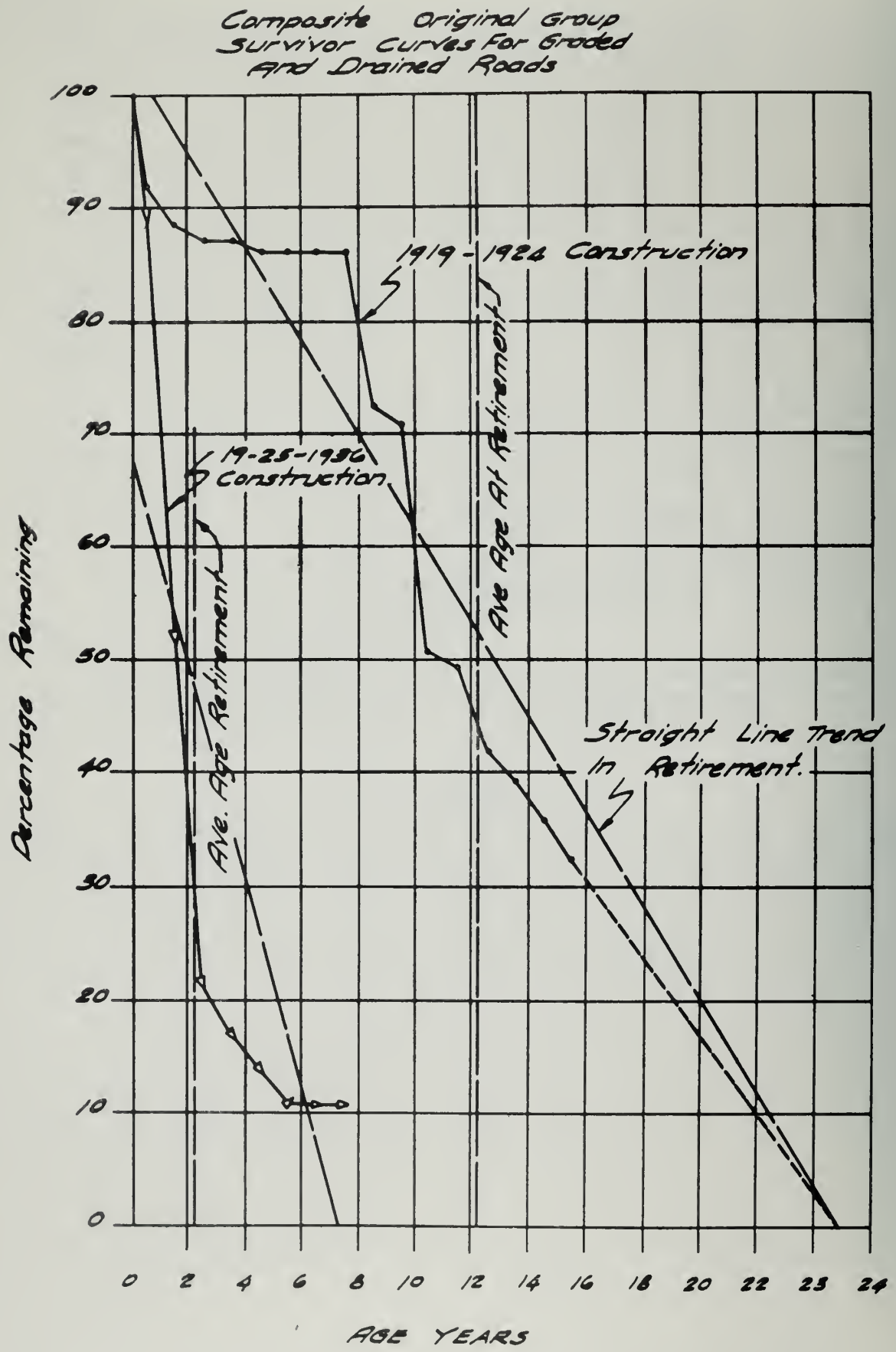
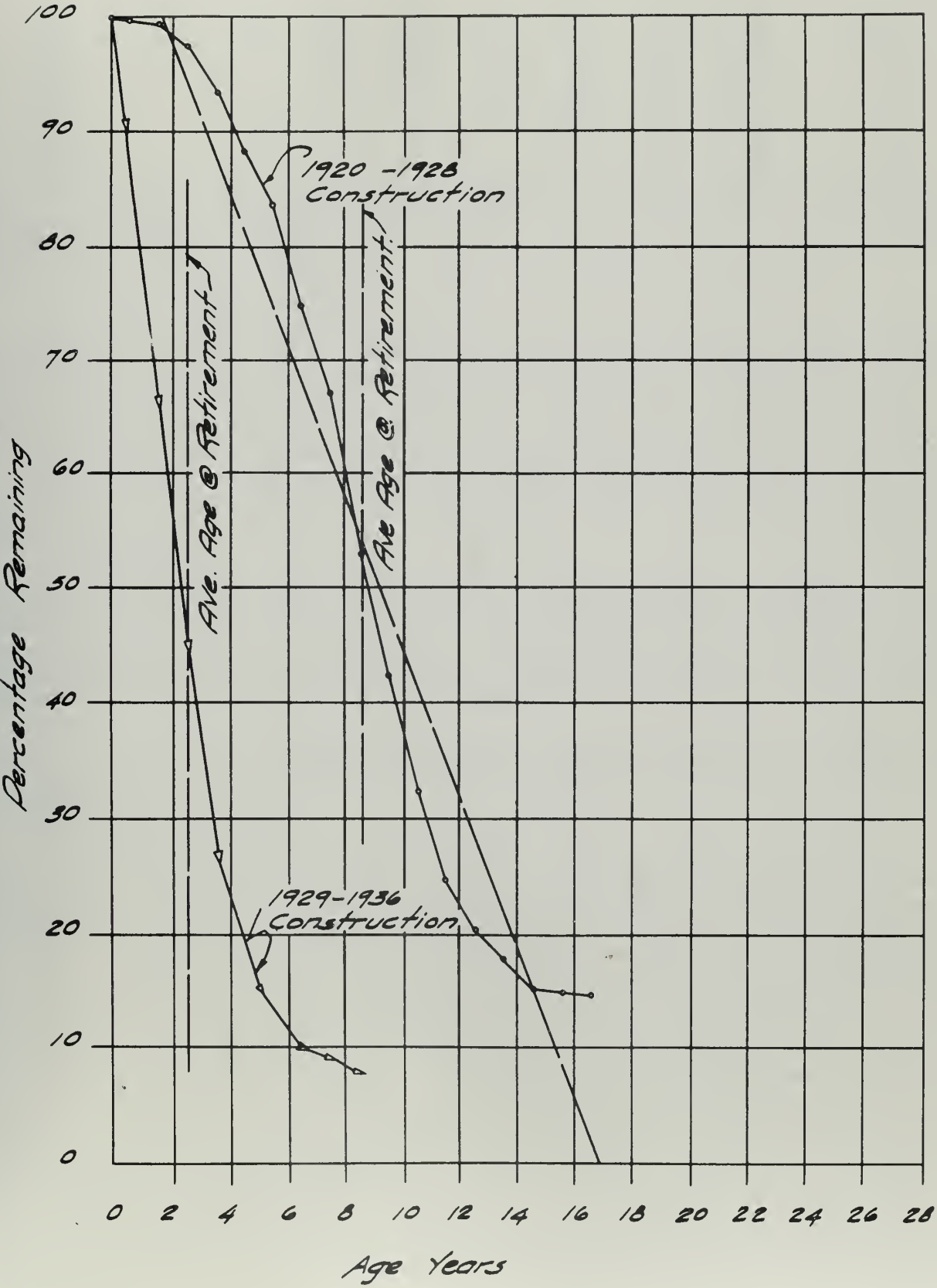


PLATE XXIII B

Composite Original Group
Survivor Curve For
Gravelled Roads



SHOWING MILES OF ROADWAY BEARING HIGH TYPE BITUMINOUS SURFACING AND SURVIVING MILEAGE ON THE PRIMARY SYSTEM

Constructed		Surviving Mileage July 1								Age of Mileage in Service
Year*	Miles	1929 Mi.	1930 Mi.	1931 Mi.	1932 Mi.	1933 Mi.	1934 Mi.	1935 Mi.	1936 Mi.	July 1, 1936
1929	23	23	23	23	23	23	23	23	23	7.5
1930	101		78	78	78	78	71	71	71	6.5
1931	344			243	243	243	242	242	241	5.5
1932	588				244	244	241	227	226	4.5
1933	772					184	184	184	144	3.5
1934	1000						288	288	288	2.5
1935	1182							182	182	1.5
1936	1256								74	0.5
		23	101	344	588	772	989	1164	1189	3.7

*Fiscal year ending June 30

Significant data deriving from the charts and tables are as follows:

1. Graded and Drained Roads

a. In the formative period 1919-1924 the bulk of the earth surfaces were maintained as originally built. Beginning in 1925, the new earth surfaces which were constructed were replaced by gravel surfaces. Hence the curve 1925-1936 construction is significant in respect to a change in construction policies. In short, the earth surfaces were allowed to "cure" for a short period of time, say 1 to 2 years, before being surfaced with a higher type material.

b. The average age of the earth surfaced roads on retirement during the formative period was 12.2 years. The average age on retirement during the second phase of the program was 2.2 years.

2. Graveled Roads

a. Prior to the advent of our modern bituminous surfacing program, graveled surfaces existed in such a state that its life was truly indicative of its qualities of wear. The curve, Plate XXIII B for the 1920-1928 constructions is regular and retirements occur with some degree of uniformity. Opposed to the curve showing qualities of traffic wear resistance, we again find a curve significant of program tendencies, i.e. the material exists solely by reason of stage construction practices.

b. The probable average life of the gravel surfaces built during the period 1920-1926 was 8.4 years and the average of the gravel surface built during the period 1929-1936 was 2.4 years.

3. Bituminous Surfaces.

a. During the course of the Rural Road Inventory field work the data as collected referred generally to external features of the design, that is to say, the surface in view, or primarily apparent, was significant with respect to surface type classification. We have, therefore, our bituminous mat classification based on a questionable premise in that no values are attached to the underlying or founding course. For purposes of this report, all bituminous mats less than $2\frac{1}{2}$ inches in depth, regardless of their general structural character, are classified as low type bituminous surfaces. High type bituminous surfaces are those which are $2\frac{1}{2}$ inche s or more in depth. As evidence of this questionable classification, we may have a condition wherein a so-called high type surface exists in a deteriorated condition by reason of subgrade failure as opposed to a low type surface which may serve satisfactorily by reason of good drainage features and excellent local materials in the subgrade. In general, the high type surfaces are well supported and provide a satisfactory medium of highway transport. Taken as a group this quality is apparent when viewed in a broad range of comparison. It is probable that low type bituminous surfaces will exist through some period of the future to present information respecting economic service life and, during the interim closing with apparent completion of the system, we should have definitive data in connection with choice of surface types.

Referring once again to the gravel curve (1920-1928) which we deem consistent with the usual wear or deterioration curves and extending these data by use of proportion, we may expect service through a period of 28 years for the low type surfaces and 25 years for the high type surfaces. It is presumed that the locus of inflection of the gravel curve is reflected in greater degree in the bituminous curves as for example, the retirement at the end of $1\frac{1}{2}$ years on the gravel curves is comparable to the retirement at the end of $6\frac{1}{2}$ years and $7\frac{1}{2}$ years on the bituminous curves. Data deriving from the curves would indicate reconstruction needs at the rate of say 3.6% of the existing mileage per year or approximately 150 miles annually. Such reconstruction would naturally comprehend raising all standards with respect to alignment, sightdistance, etc., hence during our period of construction flux consideration of road life and mortality are of lesser importance and will attain principal importance only at such a time as our program achieves general initial completion.

The foregoing discussion pertains entirely to average service lives as indicated by a study of mileages constructed and retired; and it is realized that average lives based upon dollars instead of mileages may present an entirely different picture of service life.

CHAPTER VIII

DISCUSSION OF UNIT COSTS - PRESENT AND PROBABLE FUTURE

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VIII

DISCUSSION OF UNIT COSTS - PRESENT AND PROBABLE FUTURE

This report has treated at some great length with the inventory of the several highway systems, the use of these several systems in terms of traffic volume, the specific facilities afforded by each of the several systems and other data of equal interest. Costs incident to the construction, maintenance, and administration of the highway plant, particularly the Federal Aid System, are proposed for discussion herein as a means to reach into the future and estimate the ultimate expenditure necessary to bring the system to a standard compatible with forecasts of future traffic and road use. Data are at hand for analysis whereby it is possible to present average costs per cubic yard for grading, gravel surfacing, etc., dating from the beginning of the highway program. However, the information resulting from such analysis would be useless as a premise in forecasting future costs. Unit costs have generally decreased from the inception of the highway program as a consequence of an increased knowledge concerning construction procedures. On the other hand, highways cost more per mile at the present time for the reason that modern high speed traffic demands wider roads with easy alignment and unrestricted sight distance; to provide such facilities, it is obvious that quantities must be increased with a resultant increased cost per mile. Generally speaking, the construction years of 1935, 1936 and 1937 furnish a tenable basis as regards construction costs in the future, since most engineering opinion now centers on the idea that the wearing course must have an adequate foundation to survive and additional facilities, principally width, must be provided in the interest of safety. It is thought that these two considerations will merit study and development in present and future designs.

Other costs incident to the development of the program are those relating to the purchase of right-of-way easements and the satisfaction of property damage, the maintenance of the system, engineering, administrative and overhead expense.

No attempt will be made in this discussion to allocate interest charges to the several functions of highway administration Montana's program has been one of " pay as you go" in the major part, and such rentals as have been paid for borrowing are of no great significance when reduced to an estimated cost per mile. Some authorities cite the proposition that interest should be charged for those funds expended for construction and maintenance because the funds are said to be "frozen" and not earning interest. This department holds to the idea that the funds are not "frozen". On the contrary, the facilities afforded by the expenditure are in service to the public to offset the presumption.

8.01--Costs Incident to the Development of the Federal Aid System

Costs incident to the construction and maintenance of the Federal Aid System are presented hereafter in stages of surface type attained. Coincident with the construction and maintenance costs proper are those relating to construction engineering and administrative overhead expense. Further detail concerning the distribution of costs is as follows:-

A. Construction and Reconstruction Items

1. Grading, Surfacing and Installation of Minor Drainage Structures.

a. Grading - To consist of excavating the roadway, the removal and satisfactory disposal of all materials taken from within the limits of the work, and shall include all excavation, shaping, sloping, and hauling necessary for the preparation of the embankment, subgrade, shoulders, slopes, all gutters, ditches, intersections, approaches, and private entrances, as directed to the required alignment, grade, and cross section as shown on the plans.

b. Installation of Minor Drainage Structures - To consist of furnishing and placing all pipe culverts, short span bridges (19' or under) metal ditch linings, syphons and other related and appurtenant drainage facilities as needed to provide for the drainage of the project.

c. Clearing and Grubbing - To consist of clearing the ground of all trees, brush, rubbish, and other objectionable materials within the limits designated by the Engineer, and of grubbing the roadway including borrow pits, within the limits for grubbing as designated by the Engineer.

d. Right of Way - (Not a construction item) To consist of the costs incident to the purchase of rights of way, easements and fencings and the satisfaction of property drainage claims. The award of a contract involving grading activities involves procurement of the right of way preliminary to start of work, hence, this discussion includes right of way costs as a function of grading work.

e. Traffic Service - To consist of the furnishing and placing of tangible facilities in the interest of traffic safety usually guard rail or guide posts and extra or force account work performed by the contractor for the maintenance of traffic usually on detours.

f. Construction Engineering - To consist of costs prompted by the field engineering staff in supervision of the work, to include rentals, transportation salaries, etc.

g. Administrative Costs - To consist of costs engendered by administrative officials of the department and general overhead including rentals, salaries, transportation, pre-construction engineering, etc.

h. Force Account Items - To consist of incidental costs necessary in the prosecution of the work, usually the removal of poles.

i. Plus Estimated Cost to Provide Major Drainage Structure and Railroad Grade Separations - An estimated cost per mile to provide for major drainage structures and railroad grade separations.

2. Furnishing and Placing Sub-base Material

a. Sub-base Material - To consist of the furnishing and placing of sub-base material on the prepared subgrade in accordance with the specifications and in conformity with the lines, grades and thickness shown on the plans or as designated by the engineer.

b. Traffic Service - As shown in the previous section.

c. Construction Engineering - As shown in the previous section.

d. Administrative Costs - As shown in the previous section.

e. Force Account - As shown in the previous section.

f. Plus Estimated Cost to Provide Major Drainage Structures and Railroad Grade Separations - As shown in the previous section.

3. Cushion Course

a. Cushion Course - To consist of a course of crusher-run rock or gravel constructed on the prepared sub-base material in accordance with the specifications and in conformity with the lines, grades and typical cross-section shown on the plan.

b. Traffic Service - As previously indicated.

c. Construction Engineering - As previously indicated.

d. Administrative Costs - As previously indicated.

e. Force Account - As previously indicated.

f. Plus Estimated Cost to Provide Major Drainage Structures and Railroad Grade Separations - As previously indicated.

4. Bituminous Surface Treatment

a. Top Course - To consist of the furnishing and placing of a course of crusher-run rock or gravel on the prepared cushion course and processing thereof.

b. Bituminous Surface Treatment - To consist of the cost of all bituminous materials in place.

c. Traffic Service - As previously indicated.

d. Construction Engineering - As previously indicated.

e. Administrative Costs - As previously indicated.

f. Force Account - As previously indicated.

g. Plus Estimated Cost to Provide Major Drainage Structures and Railroad Grade Separations - As previously indicated.

5. Road Mix

a. Top Course - To consist of the furnishing and placing of a course of crusher-run rock or gravel on the prepared cushion course and the processing thereof.

b. Road Mix - To consist of the cost of bituminous material in place.

c. Traffic Service - As previously indicated.

d. Construction Engineering - As previously indicated.

e. Administrative Costs - As previously indicated.

f. Force Account - As previously indicated.

g. Plus Estimated Cost to Provide Major Drainage Structures and Railroad Grade Separations - As previously indicated.

6. Plant Mix

a. Top Course - To consist of the cost of furnishing a course of crusher-run rock or gravel, the mixing thereof by process of plant mix and placing on the prepared cushion course.

b. Plant Mix - To consist of the cost of bituminous materials in place.

c. Traffic Service - As previously indicated.

d. Construction Engineering - As previously indicated.

e. Administrative Costs - As previously indicated.

f. Force Account - As previously indicated.

g. Plus Estimated Cost to Provide Major Drainage Structures and Railroad Grade Separations - As previously indicated.

Estimated costs per mile distributed in accord with the outline set forth hereinabove are as follows: (Data derive from construction records of previous years 1935, 1936, and 1937 as stated at the beginning of this chapter.

Table 57

ESTIMATED COST PER MILE OF HIGHWAY CONSTRUCTION

CLASSIFIED BY STANDARD WIDTHS DEVELOPED IN CHAPTER V

	Standard Widths	Grading	Minor Drainage Structures	Clearing & Grubbing	Right of Way	Sub-base	Cushion Course	Top Course (Preparation and Processing)	Bituminous Surfaces (Cost of Bit. Materials)	Road Mix (Cost of Bit. Materials)	Plant Mix (Cost of Bit. Materials)	Traffic Service	Construction Engineering	Admin. Costs (Inc. Preconst.)	Force Acc't. Items	Sub-Total Estimated Budgeted Cost of Roadway Items	Plus Estimated Cost to Provide Major Drainage Structures & R.R. Grade Separations	Total Estimated Budgeted Cost Per Mile of New Highway
Grading &	30.00	5,385	1,395	195	700							105	495	205	10	8,490	935	9,425
Installation	32.00	5,740	1,490	210	745							110	530	220	15	9,060	1,030	10,090
of Minor	36.00	6,460	1,675	235	840							125	595	245	15	10,190	1,130	11,320
Drainage	40.00	7,180	1,860	260	935							140	660	270	15	11,320	1,225	12,545
Structures	43.00	7,540	1,955	275	980							145	695	285	15	11,890	1,320	13,210
	46.00	7,895	2,050	285	1,025							155	725	300	20	12,455	1,415	13,870
Furnishing &	26.75					1,980						25	125	55	5	2,190	240	2,430
Placing	28.75					2,130						25	130	60	5	2,350	265	2,615
Sub-Base	32.75					2,425						30	150	70	5	2,680	295	2,975
Material	36.75					2,720						35	170	80	5	3,010	325	3,335
	39.75					2,870						35	175	85	5	3,170	350	3,520
	42.75					3,015						35	185	85	5	3,325	375	3,700
Furnishing &	25.50						1,895					15	130	60	5	2,105	235	2,340
Placing	27.50						2,045					15	140	65	5	2,270	260	2,530
Cushion	31.50						2,340					20	160	75	5	2,600	290	2,890
Course	35.50						2,635					25	180	85	5	2,930	320	3,250
	38.50						2,785					25	190	90	5	3,095	345	3,440
	41.50						2,935					25	200	95	5	3,260	370	3,630
Top Course	18.00 (																	
Surfacing &	24.00							1,580	970			25	120	55	5	2,755	490	3,245
Bituminous	20.00 (																	
Surface	26.00							1,715	1,080			25	130	60	5	3,015	555	3,570
Treatment	22.00 (																	
	30.00							1,975	1,190			30	150	70	5	3,420	610	4,030
	24.00 (																	
	34.00							2,240	1,295			35	165	80	5	3,820	665	4,485
	27.00																	
	37.00							2,370	1,405			40	180	85	5	4,085	730	4,815
	30.00																	
	40.00							2,500	1,510			40	190	90	5	4,335	795	5,130
Top Course	18.00 (							2,350		1,660		65	240	125	5	4,445	490	4,935
Surfacing	24.00																	
& Road Mix	20.00 (							2,550		1,840		70	270	140	5	4,875	555	5,430
	26.00																	
	22.00 (							2,940		2,025		80	300	155	5	5,505	610	6,115
	30.00																	
	24.00 (							3,330		2,210		90	340	170	5	6,145	665	6,810
	34.00																	
	27.00							3,530		2,395		100	360	185	5	6,575	730	7,305
	37.00																	
	30.00							3,725		2,580		105	380	195	5	6,990	795	7,785
	40.00																	
Plant Mix	18.00 (							3,030			1,735	60	215	155	5	5,200	490	5,690
	24.00																	
	20.00 (							3,285			1,930	70	235	170	5	5,695	555	6,250
	26.00																	
	22.00 (							3,790			2,120	75	265	190	5	6,445	610	7,055
	30.00																	
	24.00 (							4,295			2,315	85	300	215	5	7,215	665	7,880
	34.00																	
	27.00							4,550			2,505	90	320	230	5	7,700	730	8,430
	37.00																	
	30.00							4,800			2,700	95	335	245	5	8,180	795	8,975
	40.00																	

Table 57 (Cont'd)

	Standard Width	Grading	Minor Drainage Structures	Clearing & Grubbing	Right of Way	Sub-base	Cushion Course	Top Course (Preparation and Processing)	Bituminous Surface Treatment (Cost of Bit. Materials)	Road Mix (Cost of Bit. Materials)	Plant Mix (Cost of Bit. Materials)	Traffic Service	Construction Engineering	Admin. Costs (Inc. Preconst.)	Force Acct. Items	Sub-Total Estimated Budgeted Cost of Roadway Items	Plus Estimated Cost to Provide Major Drainage Structures & R. R. Grade Separations	Total Estimated Budgeted Cost Per Mile of New Highway
Grading, Minor	26.75	5,385	1,395	195	700	1,980						130	620	260	15	10,680	1,175	11,855
Drainage	28.75	5,740	1,490	210	745	2,130						135	660	280	20	11,410	1,295	12,705
Structures &	32.75	6,460	1,675	235	840	2,425						155	745	315	20	12,870	1,425	14,295
Sub-base	36.75	7,180	1,860	260	935	2,720						175	830	350	20	14,330	1,550	15,880
Material	39.75	7,540	1,955	275	980	2,870						180	870	370	20	15,060	1,670	16,730
	42.75	7,895	2,050	285	1,025	3,015						190	910	385	25	15,780	1,790	17,570
Grading, Minor	25.50	5,385	1,395	195	700	1,980	1,895					145	750	320	20	12,785	1,410	14,195
Drainage	27.50	5,740	1,490	210	745	2,130	2,045					150	800	345	25	13,680	1,555	15,235
Structures &	31.50	6,460	1,675	235	840	2,425	2,340					175	905	390	25	15,470	1,715	17,185
Sub-base &	35.50	7,180	1,860	260	935	2,720	2,635					200	1,010	435	25	17,260	1,870	19,130
Cushion Course	38.50	7,540	1,955	275	980	2,870	2,785					205	1,060	460	25	18,155	2,015	20,170
	41.50	7,895	2,050	285	1,021	3,015	2,935					215	1,110	480	30	19,040	2,160	21,200
Grading, Minor	18.00	5,385	1,395	195	700	1,980	1,895	1,580	970			170	870	375	25	15,540	1,900	17,440
Drainage	20.00	5,740	1,490	210	745	2,130	2,045	1,715	1,080			175	930	405	30	16,695	2,110	18,805
Structures,	22.00	6,460	1,675	235	840	2,425	2,340	1,975	1,190			205	1,055	460	30	18,890	2,325	21,215
Sub-base,	24.00	7,180	1,860	260	935	2,720	2,635	2,240	1,295			235	1,175	515	30	21,080	2,535	23,615
Cushion Course	27.00	7,540	1,955	275	980	2,870	2,785	2,370	1,405			245	1,240	545	30	22,240	2,745	24,985
& Bit. Surface	30.00	7,895	2,050	285	1,025	3,015	2,935	2,500	1,510			255	1,300	570	35	23,375	2,955	26,330
Treatment																		
Grading, Minor	18.00	5,385	1,395	195	700	1,980	1,895	2,350		1,660		210	990	445	25	17,230	1,900	19,130
Drainage	20.00	5,740	1,490	210	745	2,130	2,045	2,550		1,840		220	1,070	485	30	18,555	2,110	20,665
Structures,	22.00	6,460	1,675	235	840	2,425	2,340	2,940		2,025		255	1,205	545	30	20,975	2,325	23,300
Sub-base,	24.00	7,180	1,860	260	935	2,720	2,635	3,330		2,210		290	1,350	605	30	23,405	2,535	25,940
Cushion Course	27.00	7,540	1,955	275	980	2,870	2,785	3,530		2,395		305	1,420	645	30	24,730	2,745	27,475
& Road Mix	30.00	7,895	2,050	285	1,025	3,015	2,935	3,725		2,580		320	1,490	675	35	26,030	2,955	28,985
Oiling																		
Grading, Minor	18.00	5,385	1,395	195	700	1,980	1,895	3,030			1,735	205	965	475	25	17,985	1,900	19,885
Drainage	20.00	5,740	1,490	210	745	2,130	2,045	3,285			1,930	220	1,035	515	30	19,375	2,110	21,485
Structures,	22.00	6,460	1,675	235	840	2,425	2,340	3,790			2,120	250	1,170	580	30	21,915	2,325	24,240
Sub-base,	24.00	7,180	1,860	260	935	2,720	2,635	4,295			2,315	285	1,310	650	30	24,475	2,535	27,010
Cushion Course	27.00	7,540	1,955	275	980	2,870	2,785	4,550			2,505	295	1,380	690	30	25,855	2,745	28,600
& Plant Mix	30.00	7,895	2,050	285	1,025	3,015	2,935	4,800			2,700	310	1,445	725	35	27,220	2,955	30,175
Oiling																		

Costs incident to reconstruction are approximately the same as those given hereinabove, particularly those costs relating to surfacing items. Some salvage values are realized as a function of regrading, the cost of which is estimated to be as follows:

Half-Section Used In Compilation Of Construction Cost Data
(Column 2)

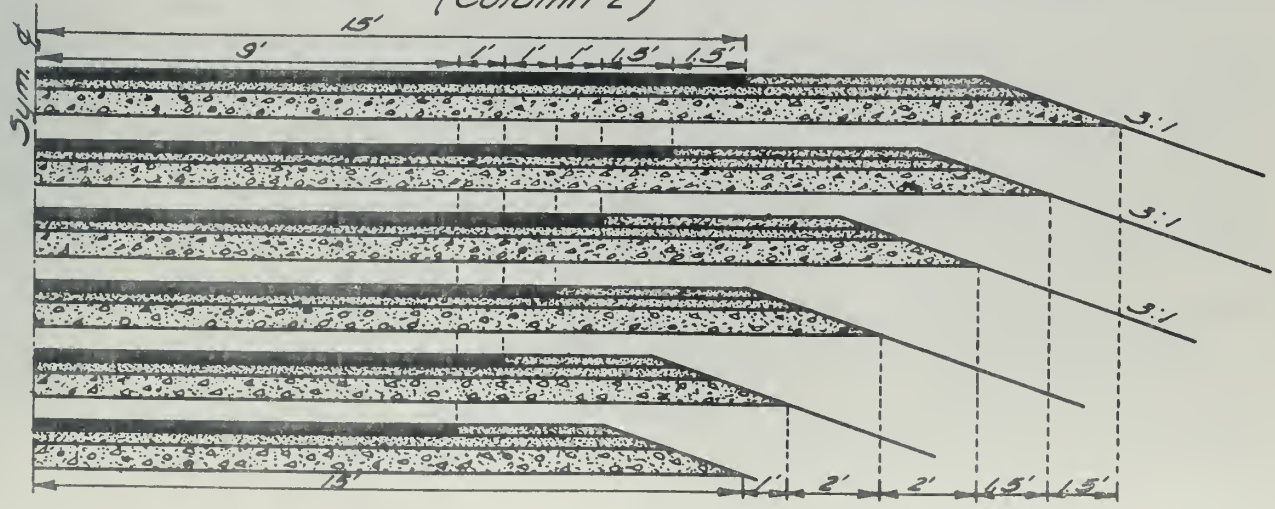


Table 58

ESTIMATED COSTS OF REGRADING CLASSIFIED

BY WIDTHS AND MEASURE OF WIDENING

Existing Grade Width	Widened to	Grading	Minor Drainage Structures	Clearing & Grubbing	Right of Way	Traffic Service	Construction Engineering	Admin. Costs	Force Acc't.	Sub-total Roadway Items	Plus Estimated Costs to Provide Major Drainage Structures & R.R. Grade Separstions	Total Estimated Cost Per Mile of Regrading
14	30	4,280	1,225	85	435	65	395	150	5	6,640	935	7,575
	32	4,635	1,320	100	480	70	430	165	10	7,210	1,030	8,240
	36	5,355	1,505	125	575	85	495	190	10	8,340	1,130	9,470
	40	6,075	1,690	150	670	100	560	215	10	9,470	1,225	10,695
	42	6,435	1,785	165	715	105	595	230	10	10,040	1,320	11,360
	44	6,790	1,880	175	760	115	625	245	15	10,605	1,415	12,020
16	30	4,120	1,205	65	395	55	385	140	5	6,370	935	7,305
	32	4,475	1,300	80	440	60	420	155	10	6,940	1,030	7,970
	36	5,195	1,485	105	535	75	485	180	10	8,070	1,130	9,200
	40	5,915	1,670	130	630	90	550	205	10	9,200	1,225	10,425
	42	6,275	1,765	145	675	95	585	220	10	9,770	1,320	11,090
	44	6,630	1,860	155	720	105	615	235	15	10,335	1,415	11,750
18	30	3,965	1,180	50	360	50	370	135	5	6,115	935	7,050
	32	4,320	1,275	65	405	55	405	150	10	6,685	1,030	7,715
	36	5,040	1,460	90	500	70	470	175	10	7,815	1,130	8,945
	40	5,760	1,645	115	595	85	535	200	10	8,945	1,225	10,170
	42	6,120	1,740	130	640	90	570	215	10	9,515	1,320	10,835
	44	6,475	1,835	140	685	100	600	230	15	10,080	1,415	11,495
20	30	3,805	1,155	35	310	45	355	125	5	5,835	935	6,770
	32	4,160	1,250	50	355	50	390	140	10	6,405	1,030	7,435
	36	4,880	1,435	75	450	65	455	165	10	7,535	1,130	8,665
	40	5,600	1,620	100	545	80	520	190	10	8,665	1,225	9,890
	42	5,960	1,715	115	590	85	555	205	10	9,235	1,320	10,555
	44	6,315	1,810	125	635	95	585	220	15	9,800	1,415	11,215
22	30	3,645	1,130	20	280	40	340	115	5	5,575	935	6,510
	32	4,000	1,225	35	325	45	375	130	10	6,145	1,030	7,175
	36	4,720	1,410	60	420	60	440	155	10	7,275	1,130	8,405
	40	5,440	1,595	85	515	75	505	180	110	8,405	1,225	9,630
	42	5,800	1,690	100	560	80	540	195	10	8,975	1,320	10,295
	44	6,155	1,785	110	605	90	570	210	15	9,540	1,415	10,955
24	30	3,490	1,105	5	245	35	325	110	5	5,320	935	6,255
	32	3,845	1,200	20	290	40	360	125	10	5,890	1,030	6,920
	36	4,565	1,385	45	385	55	425	150	10	7,020	1,130	8,150
	40	5,285	1,570	70	480	70	490	175	10	8,150	1,225	9,375
	42	5,645	1,665	85	525	75	525	190	10	8,720	1,320	10,040
	44	6,000	1,760	95	570	85	555	205	15	9,285	1,415	10,700
26	30	3,330	1,085	5	205	25	315	100	5	5,070	935	6,005
	32	3,685	1,180	5	250	30	350	115	10	5,625	1,030	6,655
	36	4,405	1,365	25	345	45	415	140	10	6,750	1,130	7,880
	40	5,125	1,550	50	440	60	480	165	10	7,880	1,225	9,105
	42	5,485	1,645	65	485	65	515	180	10	8,450	1,320	9,770
	44	5,840	1,740	75	530	75	545	195	15	9,015	1,415	10,430
28	30	3,175	1,060	5	170	20	300	95	5	4,830	935	5,765
	32	3,530	1,155	5	215	25	335	110	10	5,385	1,030	6,415
	36	4,250	1,340	10	310	40	400	135	10	6,495	1,130	7,625
	40	4,970	1,525	35	405	55	465	160	10	7,625	1,225	8,850
	42	5,330	1,620	50	450	60	500	175	10	8,185	1,320	9,505
	44	5,685	1,715	60	495	70	530	190	15	8,760	1,415	10,175
30	30	3,015	1,035	5	130	15	285	85	5	4,575	935	5,510
	32	3,370	1,130	5	175	20	320	100	10	5,130	1,030	6,160
	36	4,090	1,315	5	270	35	385	125	10	6,235	1,130	7,365
	40	4,810	1,500	20	365	50	450	150	10	7,355	1,225	8,580
	42	5,170	1,595	35	410	55	485	165	10	7,925	1,320	9,245
	44	5,525	1,690	45	455	65	515	180	15	8,490	1,415	9,905

B. General Maintenance Items

Maintenance costs include those several expenditures made to preserve the road structure in the condition in which it was left on completion of construction or reconstruction activities. By so defining these costs, we exclude discussion of expenditures dedicated to improvement of the highway plant; these operations are commonly called "betterments" and, while executed by the Maintenance Department, they are, strictly speaking, a function of construction. Betterments operate to increase the inventory value of the road plant as a whole, while maintenance operations tend to preserve the original inventory value.

As a function of budgetary control, maintenance expenditures are segregated into items of general maintenance and special maintenance. The latter category comprehends extraordinary conditions, such as resurfacing, addition of filler, slides and washouts of some great magnitude or any operation involving expenditure of unusual amount. Since these contingencies develop with more or less regularity these costs are included with general maintenance in the latter part of this section.

Maintenance costs are subject to further breakdown into direct and indirect expenditures. The first mentioned being those costs prompted by field operation and the second including the several items of overhead, rentals, equipments, administration, insurance, etc. Direct expenditures are set up and defined as follows:

1. Unsurfaced, Rock or Gravel

To include all costs prompted by field operations in the maintenance of earth rock or gravel surfaced sections (shoulder to shoulder). These costs generally specific, shall comprise labor charges, costs for expendable equipment or materials, operating costs of motorized equipment.

2. Concrete, Bituminous or Oiled Surface.

To include all costs prompted by field operations in the maintenance of bituminous or oiled surfaces (shoulder to shoulder).

3. Shoulders, Ditches, etc.

To include all field costs incident to work outside the shoulders of the road such as shouldering, drainage, removal of weeds and trash from borrow pits, and from under bridges, and work around bridge ends.

4. Slides and Washouts.

To include all field costs incident to the removal of slides and the repair of washouts.

5. Guard Rail and Guide Posts

To include all field costs incident to painting, relining and general maintenance on guard rail and guide posts.

6. Right-of-way Fence.

To include all expenditures prompted by field operations in the maintenance of joint highway railroad right-of-way fences in those cases whereby the State is obligated by easement clauses for such maintenance.

7. Bridges

To include all expenditures prompted by field operations in the maintenance of major drainage structures. To facilitate discussion, bridge costs are budgeted as a cost per mile of roadway.

Indirect costs comprehend the several items of "overhead" as follows:

1. Rentals, Light, Heat, etc.

To include all rentals for maintenance offices, field shops and garages and costs for light, heat, etc. pro-rated to each of the several direct costs.

2. Equipment Parts, Overhaul, etc.

To include all costs incident to the maintenance of motorized or massive equipment pro-rated to each of the several field operations comprehended under direct costs.

3. Field Superintendence

To include salaries of foremen (supervisory) pro-rated to each of the several direct cost items.

4. Supervision

To include engineering costs incident to field operations.

5. Insurance

To include cost premiums and pro-rated to each of the several direct cost items.

6. Distribution of Supplies

To include cost of delivery of expendable materials including salary of the messenger and fuel costs pro-rated to each of the several direct cost items.

7. Shops, Equipment, etc.

To include an amortization value for shops and rental on equipment pro-rated to each of the several direct cost items.

8. Administration

To include the salaries of administrative officials and operating departmental costs pro-rated to each of the several direct cost items.

C. Traffic Service

This heading comprehends expenditures made in the interest of convenience and safety for the traveling public and includes the items of Snow Removal and Sanding, Erection of Snow Fence, Signs and Signals, and Centerline Paint or Stripe. These costs are subject to segregation, direct and indirect as follows:

1. Direct Costs

a. Snow removal and sanding - To include field costs incident to the removal of snow and sanding of the roadway to alleviate slippery, icy conditions. (Including the cost of stocking such material as is necessary).

b. Erection of snow fence - To include field costs incident to the erection and removal of snow fence and the cost of such fence.

c. Signs and Signals - To include the field cost of the maintenance and replacement of road signs and signals and the purchase price of same.

d. Centerline Paint or Stripe - To include costs prompted by field operations in painting a centerline stripe.

Indirect costs are similar to those outlined in Caption B of this section.

D. Roadside Beautification and Campsites - Includes a direct charge incident to field operations in the maintenance and up-keep of roadside beautification projects and campsites. Indirect charges are pro-rated as set forth in Caption B of this section.

E. Traffic Surveys - Include a direct charge incident to field conduct of traffic surveys and regulatory load control as needed. Indirect charges are pro-rated in accord with practice outlined in Caption B of this section.

F. Betterments - As stated heretofore, betterments are not included in this discussion as a function of maintenance. However, in a statement of expenditures by the Maintenance Division, they are set forth in the tabulation which follows as a point of interest in the problem of highway administration.

Expenditures by the Maintenance Division in the interest of general maintenance special maintenance and betterments for the period 1931 through the fiscal year of 1936 are as follows:

1/ 1 - General Maintanance
2 - Special Maintenance
3 - Betterments
4 - Total Expenditures

TABLE 59
EXPENDITURES IN THE INTEREST OF GENERAL MAINTENANCE, SPECIAL MAINTENANCE AND BETTERMENTS FOR THE PERIOD 1931-1936 RATED BY COST PER MILE PER YEAR.

Fiscal Yeer	Surface Type	Type of Expenditure 1/	Length	Average Width	Unsurfaced Rock or Gravel	Concrete, Bit., or Oiled Surface	Shoulders, Ditches, Etc.	Slidee & Washouts	Guard Fence & Guide Poets	Snow Removel & Sanding	Bridges	Signs & Signels	Centerline Paint or Stripe	Traffic Counts & Surveys	Rentals, Light, Heat, Etc.	Erection of Snow Fence etc.
		1	541,076	21.59	115.29		36.64	3.92	0.94	7.85	1.33	1.05				3.16
		2	541.076	21.59	0.14			17.81								
	Graded &	3	541.076	21.59	55.71		6.64	0.05	0.82	0.18	1.72					1.32
	Drained	4	541.076	21.59	171.14		43.28	21.78	1.76	8.03	3.05	1.05				4.48
		1	2.152.752	15.09	150.83		34.80	3.43	3.95	11.34	1.49	1.56			0.04	3.21
		2	2.152.752	15.09	10.06		0.09	4.16	0.11							
	Gravel	3	2.152.752	15.09	56.94		2.45		1.80	0.43	11.32	0.08				1.23
	Surfacad	4	2,152.752	15.09	217.63		37.34	7.59	5.86	11.77	12.81	1.64			0.04	4.44
		1	160,410	18.11		136.39	63.06	4.65	8.90	18.27	2.30	11.46			0.41	2.59
		2	160.410	18.11		84.18		11.59								
	Low Type	3	160.410	18.11		199.85	51.29		34.08						12.79	1.58
	Bit.Surfeca	4	160.410	18.11		420.42	114.35	16.24	42.98	18.27	2.30	11.46			13.20	4.17
		1	347.646	18.25		97.50	65.93	5.04	5.71	17.12	0.64	4.71			0.34	2.25
	High Type	2	347.646	18.25		51.08		9.69								
	Bituminous	3	347.646	18.25		115.61					1.21					1.55
	Surfece	4	347.646	18.25		264.19	65.93	14.73	5.71	17.12	1.85	4.71			0.34	3.80
		1	39.322	19.36		120.16	88.02	10.71	37.61	26.65	17.04	60.60			2.11	1.25
		2	39.322	19.36		5.26		3.89								
	Concrete	3	39.322	19.36												
	Paving	4	39.322	19.36		125.42	88.02	14.60	37.61	26.65	17.04	60.60			2.11	1.25
		1	11.199	18.10		130.37	42.06	9.20	6.79	30.27		1.96			3.21	3.84
		2	11.199	18.10				4.11								
	Bituminoue	3	11.199	18.10			87.60									
	Macadam	4	11.199	18.10		130.37	129.66	13.31	6.79	30.27		1.96			3.21	3.84
		1	3,252.405	15.75	119.01	19.05	40.49	3.85	4.30	11.97	1.60	3.02			0.03	3.05
	All	2	3,252.405	15.75	6.68	9.68	0.03	7.38	0.03							
	Improved	3	3,252.405	15.75	46.96	22.21	5.56	0.01	3.01	0.38	7.91	0.03			0.63	1.28
1931	Types	4	3,252.405	15.75	172.65	50 94	46 08	11.24	7.34	12.35	9.51	3.05			0.66	4.33
		1	494.691	21.32	84.79		25.72	8.63	3.13	12.81	3.01	4.26				3.64
		2	494.691	21.32	2.21			6.92			7.80					
	Graded &	3	494.691	21.32	3.02		11.92									0.09
	Drained	4	494.691	21.32	90.02		37.64	15.55	3.13	12.81	10.81	4.26				3.73
		1	2,032.194	14.80	125.08		26.32	4.84	3.70	11.47	2.57	3.14				3.67
		2	2,032.194	14.80	5.50			0.73			2.43					
		3	2,032.194	14.80	0.87						0.74					
	Grevel	4	2,032.194	14.80	131.45		26.32	5.57	3.70	11.47	5.74	3.14				3.67
		1	421.203	18.59		133.41	42.72	5.17	7.84	24.85	2.38	8.97	0.01		0.26	5.62
	Low Type	2	421.203	18.59		77.15		14.11								
	Bituminous	3	421.203	18.59		51.28	1.67				3.36	0.16				
	Surfecing	4	421.203	18.59		261.84	44.39	19.28	7.84	24.85	5.74	9.13	0.01		0.26	5.62
		1	38.150	19.34		108.91	72.42	8.65	14.78	38.58	20.92	25.24	1.44		0.68	4.19
		2	38.150	19.34		11.45		0.21								
	Concrete	3	38.150	19.34												
	Paving	4	38.150	19.34		120.36	72.42	8.86	14.78	38.58	20.92	25.24	1.44		0.68	4.19
		1	13.319	18.09		143.40	45.50	3.23	10.06	32.21	2.40	8.86			2.70	5.33
		2	13.319	18.09				1.20								
	Bituminous	3	13.319	18.09												
	Macadam	4	13.319	18.09		143.40	45.50	4.43	10.06	32.21	2.40	8.86			2.70	5.33
		1	3,544.663	16.06	83.54	37.98	31.88	6.39	4.91	15.00	2.48	5.01	0.02		0.08	3.87
	All	2	3,544.663	16.06	3.46	12.24	3.28				2.48					
	Improved	3	3,544.663	16.06	0.92	6.09	2.26		0.87		1.21	0.02				0.01
1932	Types	4	3,544.663	16.06	87.92	56.31	37.42	6.39	5.78	15.00	6.17	5.03	0.02		0.08	3.88
		1	385.851	20.91	60.83		25.06	4.81	1.44	1.90	5.57	1.44				6.62
		2	385.851	20.91	24.58			6.56	0.09	3.40						
	Graded &	3	385.851	20.91	2.99										0.08	0.43
	Dreined	4	385.851	20.91	88.40		25.06	11.37	1.53	5.30	5.57	1.44			0.08	7.05
		1	2,117.780	15.69	97.95		28.28	5.06	3.87	3.26	3.93	3.48			0.04	7.00
		2	2.117.780	15.69	0.64		1.67	14.36	0.26		3.31	0.02				
	Grevel	3	2,117.780	15.69	21.19		4.18	0.04			0.22	0.17				0.18
	Surfeced	4	2.117.780	15.69	179.78		34.13	19.46	4.13	3.26	7.46	3.67			0.04	7.18
		1	693.045	18.44		100.36	40.26	5.72	9.47	3.90	1.39	7.00	0.09		0.18	7.41
	Low Type	2	693.045	18.44		44.72	6.43	0.77			0.01					
	Bituminous	3	693.045	18.44		19.86	3.90	0.03	0.02	0.01	1.61					
	Surfecing	4	693.045	18.44		164 94	50.59	6.52	9.49	3.91	3.01	7.00	0.09		0.18	7.41
		1	753.930	18.80		77.36	52.50	7.51	10.21	4.47	1.05	8.39	0.08		0.07	7.27
	High Type	2	753.930	18.80		22.67	6.77	0.05	0.13							
	Bituminous	3	753.930	18.80		0.61			1.50		2.54					
	Surfecing	4	753.930	18.80		100.64	59.27	7.56	11.84	4.47	3.59	8.39	0.08		0.07	7.27
		1	37.892	19.18		96.12	88.75	16.42	17.73	5.30	12.93	26.84				7.89
		2	37.892	19.18		0.53										
	Concrete	3	37.892	19.18												
	Paving	4	37.892	19.18		96.65	88.75	16.42	17.73	5.30	12.93	26.84				7.89
		1	13.319	18.09		115.40	36.04	2.93	16.67	3.83	0.68	9.46			0.98	15.84
		2	13.319	18.09												
	Bituminous	3	13.319	18.09												
	Macadam	4	13.319	18.09		115.40	36.04	2.93	16.67	3.83	0.68	9.46			0.98	15.84
		1	4,001.817	16.91	57.70	33.26	35.21	5.71	5.98	3.49	3.18	5.06	0.03		0.07	7.13
		2	4.001.817	16.91	2.71	12.02	3.28	8.38	0.17		2.08	0.01				
		3	4.001.817	16.91	11.50	3.56	2.89	0.03	0.29		0.87	0.10			0.01	0.13
1933	Composite	4	4,001.817	16.91	71.91	48.84	41.38	14.12	6.44	3.49	6.13	5.17	0.03		0.08	7.26

TABLE 59 (continued)

Fiscal Year	Surface Type	Type of Expenditure 1/	Length	Average Width	Unsurfaced Rock or Gravel	Concrete, Bit., or Oiled Surface	Shoulders, Ditches, Etc.	Slides & Washouts	Guard Fence & Guide Posts	Snow Removal & Sanding	Bridges	Signs & Signals	Centerline Paint or Stripe	Traffic Counts & Surveys	Rentels, Light, Rent, Etc.	Erection of Snow Fence Etc.
		1	365.785	21.26	88.95		26.65	1.74	2.51	3.05	3.88	4.26		0.01		4.37
		2	365.785	21.26	0.09			7.73			12.89					
	Graded &	3	365.785	21.26	4.44		0.27				6.78					
	Drained	4	365.785	21.26	93.48		28.92	9.47	2.51	3.05	23.55	4.26		0.01		4.37
		1	1,277.990	16.74	109.95		30.38	4.50	3.81	6.21	1.53	8.33			0.04	6.99
		2	1,277.990	16.74	8.78			5.46			0.58					
	Grnvel	3	1,277.990	16.74	5.97						0.32					
	Surfaced	4	1,277.990	16.74	124.70		30.38	9.96	3.81	6.21	2.43	8.33			0.04	6.99
		1	1,531.166	19.54		91.81	43.43	4.96	7.17	11.25	2.86	20.56	0.39		1.51	14.64
	Low Type	2	1,531.166	19.54		24.82	1.61	28.83	2.36		7.76					
	Bitominous	3	1,531.166	19.54		31.39	9.14				4.38					
	Surfacing	4	1,531.166	19.54		148.02	54.18	33.79	9.53	11.25	15.00	20.56	0.39		1.51	14.64
		1	953.548	18.99		103.80	64.04	3.16	7.28	12.55	1.04	18.77				4.08
	High Type	2	953.548	18.99		41.64	1.24	3.37	0.55		0.06					
	Bituminous	3	953.548	18.99		45.83	7.85				0.04					
	Surfacing	4	953.548	18.99		191.27	73.13	6.53	7.83	12.55	1.11	18.77				4.08
		1	39.033	20.37		256.76	123.74	9.38	14.12	31.49	2.02	52.01				3.95
		2	39.033	20.37												
	Concrete	3	39.033	20.37		88.13	18.14									
	Paving	4	39.033	20.37		344.89	141.88	9.38	14.12	31.49	2.02	52.01				3.95
		1	7.750	18.15		142.71	42.45	4.77	7.48	12.26		21.81				10.97
		2	7.750	18.15												
	Bituminous	3	7.750	18.15												
	Macadam	4	7 750	18.15		142.71	42.45	4.77	7.48	12.26		21.81				10.97
		1	4,175.272	18.13	41.45	60.04	43.60	4.17	5.83	9.47	2.02	15.28	0.14		1.18	14.63
		2	4,175.272	18.13	2.70	18.61	0.88	13.69	0.99		4.16					
		3	4,175.272	18.13	2.21	22.80	5.34				2.30					
1934	Composite	4	4,175.272	18.13	46.36	101.45	49.82	17.86	6.82	9.47	8.48	15.28	0.14		1.18	14.63
		1	263.909	20.57	73.23		29.28	2.23	2.03	15.30	3.15	4.75		0.28	2.35	4.34
		2	263.909	20.57	0.41		0.04	23.59								
	Graded &	3	263.909	20.57	11.90		0.01									
	Dreined	4	263.909	20.57	85.54		29.33	25.82	2.03	15.30	3.15	4.75		0.28	2.35	4.34
		1	1,134.636	17.17	84.16		30.56	4.73	2.09	16.45	1.68	7.17		0.52	2.49	6.41
		2	1,134.636	17.17	3.42		4.46	6.36			0.26	0.03				
	Grevel	3	1,134.636	17.17	0.27		11.16									
	Surfaced	4	1,134.636	17.17	87.85		46.18	11.09	2.09	16.45	1.94	7.20		0.52	2.49	6.41
		1	1,817.790	19.77		86.15	35.52	5.41	3.75	20.66	3.37	8.82	6.32	0.57	2.19	8.96
	Low Type	2	1,817.790	19.77		22.18	4.89	4.22		0.49	0.62					
	Bituminous	3	1,817.790	19.77		17.12	0.10									2.21
	Surfacing	4	1,817.790	19.77		125.45	40.51	9.63	3.75	21.15	3.99	8.82	6.32	0.57	2.19	11.17
		1	1,116.246	19.02		108.79	49.90	3.39	4.98	21.70	1.34	8.01	7.31	0.67	3.20	5.02
	High Type	2	1,116.246	19.02		24.66	2.54	6.72								
	Bituminous	3	1,116.246	19.02		46.43	2.54		0.11							
	Surfacing	4	1,116.246	19.02		179.88	54.96	10.11	5.09	21.70	1.34	8.01	7.31	0.67	3.20	5.02
		1	40.089	20.33		192.02	92.59	0.97	5.59	32.05	8.38	16.61	13.17	1.15	3.72	4.69
		2	40.089	20.33		17.36	3.49	7.86								
	Concrete	3	40.089	20.33												
	Paving	4	40.089	20.33		209.38	96.08	8.63	5.59	32.05	8.38	16.61	13.17	1.15	3.72	4.69
		1	10.021	18.54		99.39	38.11	0.70	4.89	31.93		9.96	6.39	0.60	1.60	10.18
		2	10.021	18.54		13.67										
	Bituminous	3	10.021	18.54												
	Macadam	4	10.021	18.54		113.06	38.11	0.70	4.89	31.93		9.98	6.39	0.60	1.60	10.18
		1	4,382.691	18.85	26.20	65.42	38.05	4.48	3.55	19.64	2.44	7.98	4.66	0.57	2.55	6.98
		2	4,382.691	18.85	0.91	15.67	3.86	6.60		0.20	0.32		0.01			
		3	4,382.691	18.85	0.79	18.93	3.58		0.03							0.91
1935	Composite	4	4,382.691	18.85	27.90	100.02	45.49	11 08	3.58	19.84	2.76	7.98	4.67	0.57	2.55	7.89
		1	220.392	20.87	61.32		24.71	6.18	1.61	18.28	5.43	3.92			1.21	3.74
		2	220.392	20.87	5.51			0.88	1.33		30.21					
	Graded &	3	220.392	20.87	20.45				0.66	0.17	6.32					
	Drained	4	220.392	20.87	87.28		24.71	7.06	3.60	18.45	41.96	3.92			1.21	3.74
		1	454.609	18.07	82.77		26.84	1.45	3.13	34.21	1.56	5.99		0.05	2.97	11.17
		2	454.609	18.07	9.78						1.49					
	Gravel	3	454.609	18.07	8.69		1.48									
	Surfaced	4	454.609	18.07	101.24		28.32	1.45	3.13	34.21	3.05	5.99		0.05	2.97	11.17
		1	2,634.821	19.80		91.29	30.88	3.28	4.23	29.02	2.07	7.64	2.92	0.05	2.00	8.22
	Low Type	2	2,634.821	19.80		34.66	0.87	3.32	0.50	0.11	1.30		0.02			
	Bituminous	3	2,634.821	19.80		48.31	1.83				1.57					
	Surfacing	4	2,634.821	19.80		174 26	33.58	6.60	4.73	29.13	4.94	7.64	2.94	0.05	2.00	8.22
		1	1,288.410	19.21		110.64	47.72	1.96	4.93	31.64	0.95	7.71	8.11	0.25	2.93	6.83
	High Type	2	1,288.410	19.21		21.10	2.42	6.46	0.10	0.34						
	Bituminous	3	1,288.410	19.21		23.06	9.98									
	Paving	4	1,288.410	19.21		154.80	60.12	8.42	5.03	31.98	0.95	7.71	8.11	0.25	2.93	6.83
		1	34.530	21.64		134.17	93.31	1.74	7.59	47.29	0.81	19.66	20.07	0.03	4.11	11.99
		2	34.530	21.64		0.06	2.40	69.74								
	Conorate	3	34.530	21.64												
	Paving	4	34.530	21.64		134.23	95.71	71.48	7.59	47.29	0.81	19.66	20.07	0.03	4.11	11.99
		1	10.903	22.20		121.43	42.37	0.46	7.15	53.84		9.61	8.16	0.37	2.75	6.42
		2	10.903	22.20		1.10										
	Bituminous	3	10.903	22.20												
	Macadam	4	10.903	22.20		122.53	42.37	0.46	7.15	53.84		9.81	8.16	0.37	2.75	6.42
		1	4,643.665	19.47	11.01	83.78	35.36	2.85	4.22	29.94	1.85	7.38	4.10	0.11	2.34	7.93
		2	4,643.665	19.47	1.22	25.53	1.18	4.24	0.37	0.16	2.32		0.01			
		3	4,643.665	19.47	1.82	33.81	3.95		0.03	0.01	1.19					
1936	Composite	4	4,643.665	19.47	14.05	143.12	40.49	7.09	4.62	30.11	5.36	7.38	4.11	0.11	2.34	7.93

TABLE 59 (continued)

Fiscal Year	Surface Type	Type of Expenditure 1/	Length	Average Width	Unsurfaced Rock or Gravel	Concrete, Bit., or Oiled Surfece	Shoulders, Ditches, Etc.	Slides & Washouts	Guard Fence & Guide Posts	Snow Removal & Sanding	Bridges	Signs & Signals	Centerline Peint or Stripe	Traffic Counts & Surveys	Rentals, Light, Heat, Etc.	Erection of Snow Fence Etc.
		1	2,271.704	21.17	85.03		29.00	4.77	1.96	9.02	3.43	3.04		0.03	0.39	4.24
		2	2,271.704	21.17	5.29		0.01	10.93	0.14	0.58	6.70					
	Graded &	3	2,271.704	21.17	16.52		4.22	0.01	0.26	0.06	2.11				0.01	0.41
	Drained	4	2,271.704	21.17	108.84		33.23	15.71	2.36	9.66	12.24	3.04		0.03	0.40	4.65
		1	9,169.961	15.60	115.59		29.88	4.33	3.58	10.55	2.33	4.21		0.06	0.48	5.50
		2	9,169.961	15.80	5.86		0.96	6.00	0.09		1.49	0.01				
	Gravel	3	9,169.961	15.80	19.75		2.99	0.01	0.42	0.10	2.92	0.06				0.33
	Surfaced	4	9,169.961	15.60	141.20		33.83	10.34	4.09	10.65	6.74	4.28		0.06	0.48	5.83
		1	7,258.435	19.80		94.42	36.98	4.53	5.54	20.30	2.52	10.76	2.73	0.16	1.63	9.41
	Low Type	2	7,258.435	19.80		33.98	2.49	9.49	0.68	0.16	2.27		0.01			
	Bituminous	3	7,258.435	19.80		37.73	4.22		0.76		1.84	0.01			0.28	0.59
	Surfacing	4	7,258.435	19.80		166.13	43.69	14.02	6.98	20.46	6.63	10.77	2.74	0.16	1.91	10.00
		1	5,004.886	18.92		105.40	53.18	4.54	6.57	19.47	0.99	9.82	3.73	0.21	1.53	5.28
	High Type	2	5,004.886	18.92		27.91	2.59	4.49	0.15	0.09	0.01					
	Bituminous	3	5,004.886	18.92		33.15	4.92		0.86		0.75					0.11
	Paving	4	5,004.886	18.92		166.46	60.69	9.03	7.58	19.56	1.75	9.82	3.73	0.21	1.53	5.39
		1	229.016	20.01		152.29	93.23	8.03	16.38	29.99	10.48	33.79	5.57	0.21	1.75	5.52
		2	229.016	20.01		5.95	0.97	12.60								
	Concrete	3	229.016	20.01		15.03	3.09									
	Paving	4	229.016	20.01		173.27	97.29	20.63	16.38	29.99	10.48	33.79	5.57	0.21	1.75	5.52
		1	66.511	18.84		125.28	41.04	3.52	9.28	27.37	0.62	9.65	2.30	0.15	1.97	8.75
		2	66.511	18.84		2.24		0.93								
	Bituminous	3	66.511	18.84		14.75										
	Macadam	4	66.511	18.84		142.27	41.04	4.45	9.28	27.37	0.62	9.65	2.30	0.15	1.97	8.75
	Composite	1	11,441.665		109.52		29.71	4.42	3.26	10.25	2.55	3.98		0.05	0.46	5.25
	Graded &	2	11,441.665		5.75		0.77	6.98	0.10	0.11	2.52	0.01				
	Drained &	3	11,441.665		19.51		3.23	0.01	0.39	0.09	2.76	0.05				0.35
	Graveled	4	11,441.665		134.78		33.71	11.41	3.75	10.45	7.83	4.04		0.05	0.46	5.60
	Surface															
	Concrete,	1	12,558.848	19.45		100.01	44.48	4.59	6.17	20.18	2.05	10.80	3.18	0.18	1.59	7.69
	Bituminous	2	12,558.848	19.45		30.88	2.49	7.51	0.45	0.13	1.32		0.01			
	or Oiled	3	12,558.848	19.45		35.37	4.47		0.78		1.36	0.01			0.16	0.38
	Surfece	4	12,558.848	19.45		166.26	51.44	12.10	7.40	20.31	4.73	10.81	3.19	0.18	1.75	8.07
	Composite	1	24,000.513	17.91	52.21	52.34	37.44	4.51	4.78	15.45	2.29	7.55	1.66	0.12	1.05	6.53
1931	All Im-	2	24,000.513	17.91	2.74	16.16	1.67	7.26	0.28	0.12	1.89		0.01			
-	proved	3	24,000.513	17.91	9.30	18.51	3.88		0.59	0.04	2.03	0.03			0.08	0.37
1936	Types	4	24,000.513	17.91	64.25	87.01	42.99	11.77	5.65	15.61	6.21	7.58	1.67	0.12	1.13	6.90

TABLE 59 (continued)

Fiscal Year	Surface Type	Type of Expenditure 1/	Length	Average Width	Equip. Parts O.H. Etc.	General Supervision	Roadside Development	Right of Way Fence	Campsites	Supervision	Insurance	Distribution of Supplies	Shops, Equip. Etc.	Administration	Total Cost Per Mile
		1	541.076	21.59	0.13	3.91				9.72	2.84		17.40	5.15	209.33
		2	541.076	21.59						1.80	0.29		1.85	0.56	22.45
	Graded &	3	541.076	21.59				1.10		1.46	1.22		7.73	1.52	79.47
	Drained	4	541.076	21.59	0.13	3.91		1.10		12.98	4.35		26.98	7.23	311.25
		1	2,152.752	15.09	0.02	3.96				9.18	3.63		22.82	6.50	256.76
		2	2,152.752	15.09						1.34	0.22		1.35	0.44	17.77
	Grevel	3	2,152.752	15.09						1.78	1.10		6.67	2.23	86.03
	Surfaced	4	2,152.752	15.09	0.02	3.96				12.30	4.95		30.84	9.17	360.56
		1	160.410	18.11	0.09	5.58				7.68	4.49		28.42	7.53	301.82
	Low Type	2	160.410	18.11						3.03	1.72		10.82	2.89	114.23
	Bituminous	3	160.410	18.11						3.05	5.22		33.17	8.58	349.61
	Surfacing	4	160.410	18.11	0.09	5.58				13.76	11.43		72.41	19.00	765.66
		1	347.646	18.25	0.09	6.08	0.18			7.43	3.62		23.01	6.22	245.87
	High Type	2	347.646	18.25						3.51	1.06		6.76	1.86	73.96
	Bituminous	3	347.646	18.25						1.29	2.10		13.33	3.57	138.66
	Surfacing	4	347.646	18.25	0.09	6.08	0.18			12.23	6.78		43.10	11.65	458.49
		1	39.322	19.36	0 08	5.52				8.98	6.61		42.24	9.56	437.14
		2	39.322	19.36						2.24	0.15		1.04	0.33	12.91
	Concrete	3	39.322	19.36											
	Paving	4	39.322	19.36	0.08	5.52				11.22	6.76		43.28	9.89	450.05
		1	11.199	18.10		2.14				7.77	3.75		24.11	6.96	272.43
		2	11.199	18.10						1.61	0.09		0.45	0.18	6.44
	Bituminous	3	11.199	18.10						4.11	1.52		9.38	2.68	105.29
	Macedam	4	11.199	18.10		2.14				13.49	5.36		33.94	9.82	384.16
		1	3,252.405	15.75	0.05	4.27	0.02			9.00	3.58		22.45	6.33	252.07
	All	2	3,252.405	15.75						1.74	0.39		2.47	0.73	29.13
	Improved	3	3,252.405	15.75				0.18		1.72	1.42		8.79	2.54	102.63
1931	Types	4	3,252.405	15.75	0.05	4.27	0.02	0.18		12.46	5.39		33.71	9.60	383.81
		1	494.691	21.32	6.83	3.41				8.26	4.16		25.84	8.00	202.49
		2	494.691	21.32						0.84	0.45		2.85	0.84	21.91
	Graded &	3	494.691	21.32						0.45	0.50		3.09	0.76	19.83
	Drained	4	494.691	21.32	6.83	3.41				9.55	5.11		31.78	9.60	244.23
		1	2,032.194	14.80	8.26	4.10				7.96	5.16		31.79	9.66	247.72
		2	2,032.194	14.80						0.74	0.23		1.43	0.44	11.50
		3	2,032.194	14.80						0.11	0.04		0.27	0.08	2.11
	Gravel	4	2,032.194	14.80	8.26	4.10				8.01	5.43		33.49	10.18	261.33
		1	421.203	18.59	11.54	3.72				5.51	6.80		43.23	12.28	314.31
	Low Type	2	421.203	18.59						1.25	2.10		13.12	4.20	111.93
	Bituminous	3	421.203	18.59						0.61	1.43		8.88	2.78	70.17
	Surfacing	4	421.203	18.59	11.54	3.72				7.37	10.33		65.23	19.26	496.41
		1	545.106	18.53	12.85	5.29				6.45	6.83		43.03	12.65	318.02
	High Type	2	545.106	18.53						1.93	0.49	0.01	3.05	0.79	26.79
	Bituminous	3	545.106	18.53						0.40	0.29		1.81	0.54	13.79
	Surfacing	4	545.106	18.53	12.85	5.29				8.78	7.61	0.01	47.89	13.98	358.60
		1	38.150	19.34	20.76	8.75				0.73	14.31		51.06	16.04	407.46
		2	38.150	19.34						1.28	0.42		2.54	0.63	16.53
	Concrete	3	38.150	19.34											
	Paving	4	38.150	19.34	20.76	8.75				2.01	14.73		53.60	16.67	423.99
		1	13.319	18.09	18.54	6.01				5.63	7.58		49.03	14.04	354.52
		2	13.319	18.09						0.98			0.22		2.40
	Bituminous	3	13.319	18.09											
	Macedam	4	13.319	18.09	18.54	6.01				6.61	7.58		49.25	14.04	356.92
		1	3,544.663	16.06	9.33	4.20				7.39	5.58		34.32	10.28	262.26
	All	2	3,544.663	16.06						1.00	0.52		3.27	1.00	27.25
	Improved	3	3,544.663	16.06						0.26	0.31		1.92	0.57	14.44
1932	Types	4	3,544.663	16.06	9.33	4.20				8.65	6.41		39.51	11.65	303.95

TABLE 9 (continued)

Fiscal Year	Surface Type	Type of Expenditure 1/	Length	Average Width	Equip. Parts O.H. Etc.	General Supervision	Roadside Development	Right of Way Fence	Campsites	Supervision	Insurance	Distribution of Supplies	Shops, Equip. Etc.	Administration	Total Cost Per Mile
		1	385.851	20.91	19.33	4.16	0.63			6.45	3.79	2.11	13.02	4.18	161.34
		2	385.851	20.91						0.22	1.00	0.08	3.42	1.07	40.42
	Graded &	3	385.851	20.91						0.26	0.10	0.08	0.34	0.16	4.44
	Drained	4	385.851	20.91	19.33	4.16	0.63			6.93	4.89	2.27	16.78	5.41	206.20
		1	2,117.780	15.69	29.28	4.52	0.01			5.31	5.36	1.74	18.46	5.94	223.49
		2	2,117.780	15.69						0.46	0.58	0.16	2.01	0.69	24.18
	Gravel	3	2,117.780	15.69						0.72	0.75	0.23	2.57	0.88	30.93
	Surface	4	2,117.780	15.69	29.28	4.52	0.01			6.51	6.69	2.13	23.04	7.31	278.60
		1	693.045	18.44	34.49	3.58				4.29	6.17	1.44	21.27	6.68	253.70
	Low Type	2	693.045	18.44						0.95	1.49	0.32	5.14	1.62	61.45
	Bituminous	3	693.045	18.44						0.23	0.69	0.08	2.40	0.75	29.58
	Surfacing	4	693.045	18.44	34.49	3.58				5.47	8.35	1.84	28.81	9.05	344.73
		1	753.930	18.80	40.62	5.32	0.03			4.92	6.18	1.63	21.25	6.71	255.57
	High Type	2	753.930	18.80						1.13	0.85	0.37	2.93	0.93	35.83
	Bituminous	3	753.930	18.80						0.40	0.14	0.13	0.46	0.16	5.94
	Surfacing	4	753.930	18.80	40.62	5.32	0.03			6.45	7.17	2.13	24.64	7.80	297.34
		1	37.892	19.18	64.37	19.08				4.83	10.27	1.64	35.10	10.98	416.25
		2	37.892	19.18						0.05	0.03	0.03	0.05		0.69
	Concrete	3	37.892	19.18											
	Paving	4	37.892	19.18	64.37	19.08				4.88	10.30	1.67	35.15	10.98	418.94
		1	13.319	18.09	54.21	3.75				6.01	7.36	2.03	25.68	8.11	308.98
		2	13.319	18.09											
	Bituminous	3	13.319	18.09											
	Macadam	4	13.319	18.09	54.21	3.75				6.01	7.36	2.03	25.68	8.11	308.98
		1	4,001.817	16.91	31.78	4.61	0.07			5.17	5.56	1.71	19.13	6.10	230.95
		2	4,001.817	16.91						0.65	0.82	0.22	2.83	0.92	34.09
		3	4,001.817	16.91						0.52	0.55	0.17	1.90	0.53	23.05
1933	Composite	4	4,001.817	16.91	31.78	4.61	0.07			6.34	6.93	2.10	23.86	7.55	288.09
		1	365.785	21.26	22.72	4.91		0.03		7.23	3.68	0.49	35.29	4.70	216.47
		2	365.785	21.26						0.11	0.46	0.06	2.04	0.55	23.93
	Graded &	3	365.785	21.26						0.03	0.25	0.03	1.21	0.30	13.31
	Drained	4	365.785	21.26	22.72	4.91		0.03		7.37	4.39	0.58	38.54	5.55	253.71
		1	1,277.990	16.74	31.40	4.46				6.26	4.64	0.61	29.32	5.70	254.13
		2	1,277.990	16.74						0.37	0.33	0.04	0.99	0.39	16.94
	Gravel	3	1,277.990	16.74						0.07	0.13	0.02	0.32	0.16	6.99
	Surfaced	4	1,277.990	16.74	31.40	4.46				6.70	5.10	0.67	30.63	6.25	278.06
		1	1,531.166	19.54	27.11	3.63	0.24			4.72	5.09	0.68	23.54	6.17	269.76
	Low Type	2	1,531.166	19.54						1.20	1.47	0.20	4.54	1.74	74.53
	Bituminous	3	1,531.166	19.54						1.10	1.03	0.13	2.77	1.19	51.13
	Surfacing	4	1,531.166	19.54	27.11	3.63	0.24			7.02	7.59	1.01	30.85	9.10	395.42
		1	953.548	18.99	38.29	5.92	3.40			5.04	5.86	0.78	25.54	7.05	306.60
	High Type	2	953.548	18.99						1.68	1.05	0.14	2.64	1.24	53.81
	Bituminous	3	953.548	18.99						0.69	1.20	0.16	3.09	1.41	60.27
	Surfacing	4	953.548	18.99	38.29	5.92	3.40			7.41	8.11	1.08	31.47	9.70	420.68
		1	39.033	20.37	47.81	11.12	50.37			6.61	13.50	1.77	31.72	15.88	672.25
		2	39.033	20.37											
	Concrete	3	39.033	20.37						0.95	2.38	0.36	6.53	2.77	119.26
	Paving	4	39.033	20.37	47.81	11.12	50.37			7.56	15.88	2.13	38.25	18.65	791.51
		1	7.750	18.15	37.94	2.97				5.03	6.45	0.90	17.68	7.35	320.77
		2	7.750	18.15											
	Bituminous	3	7.750	18.15											
	Macadam	4	7.750	18.15	37.94	2.97				5.03	6.45	0.90	17.68	7.35	320.77
		1	4,175.272	18.13	25.49	3.76	1.12			5.50	5.09	0.68	26.86	6.19	272.50
		2	4,175.272	18.13						0.95	0.92	0.12	2.79	1.09	46.90
		3	4,175.272	18.13						0.59	0.74	0.10	1.99	0.86	36.93
1934	Composite	4	4,175.272	18.13	25.49	3.76	1.12			7.04	6.75	0.90	31.64	8.14	356.33
		1	263.909	20.57	18.37	3.85	5.51			6.04	5.24	1.56	19.76	8.92	206.19
		2	263.909	20.57						0.57	0.77	0.23	2.79	1.29	29.69
	Graded &	3	263.909	20.57						0.04	0.38	0.11	1.39	0.63	14.46
	Drained	4	263.909	20.57	18.37	3.85	5.51			6.65	6.39	1.90	23.94	10.84	250.34
		1	1,134.636	17.17	28.42	4.89	0.08			4.65	5.99	1.77	22.08	10.12	234.26
		2	1,134.636	17.17						0.46	0.46	0.14	1.68	0.79	18.06
	Gravel	3	1,134.636	17.17						0.21	0.37	0.11	1.33	0.61	14.06
	Surfaced	4	1,134.636	17.17	28.42	4.89	0.08			5.32	6.82	2.02	25.09	11.52	266.38
		1	1,817.790	19.77	28.80	4.03	0.53	0.01		4.17	6.66	2.02	25.19	11.78	265.11
	Low Type	2	1,817.790	19.77				0.22		1.30	1.04	0.31	3.80	1.77	40.64
	Bituminous	3	1,817.790	19.77			0.09			0.24	0.62	0.19	2.24	0.83	23.64
	Surfacing	4	1,817.790	19.77	28.80	4.03	0.62	0.23		5.71	8.52	2.52	31.23	14.38	329.59
		1	1,116.246	19.02	29.96	9.02	1.72	0.59	0.11	1.26	8.81	2.60	32.30	14.84	315.52
	High Type	2	1,116.246	19.02				0.44		1.69	1.10	0.32	3.99	1.87	43.33
	Bituminous	3	1,116.246	19.02		0.19				0.29	1.58	0.47	5.67	2.63	59.91
	Surfacing	4	1,116.246	19.02	29.96	9.21	1.72	1.03	0.11	3.24	11.49	3.39	41.96	19.34	418.76
		1	40.089	20.33	36.01	6.31	22.52			5.66	13.92	4.14	50.34	24.92	534.76
		2	40.089	20.33						0.67	0.92	0.25	3.34	1.55	35.44
	Concrete	3	40.089	20.33											
	Paving	4	40.089	20.33	36.01	6.31	22.52			6.33	14.84	4.39	53.68	26.47	570.20
		1	10.021	18.54	30.54	4.39				3.79	7.78	2.00	27.64	12.47	292.38
		2	10.021	18.54						0.30	0.40	0.10	1.60	0.70	16.77
	Bituminous	3	10.021	18.54											
	Macadam	4	10.021	18.54	30.54	4.39				4.09	8.18	2.10	29.24	13.17	309.15
		1	4,382.691	18.85	28.44	5.53	1.22	0.15	0.03	3.68	7.10	2.10	26.10	12.08	268.95
		2	4,382.691	18.85				0.20		1.13	0.89	0.26	3.23	1.51	34.79
		3	4,382.691	18.85		0.05	0.04			0.23	0.78	0.23	2.80	1.21	29.58
1935	Composite	4	4,382.691	18.85	28.44	5.58	1.26	0.35	0.03	5.04	8.77	2.59	32.13	14.80	333.32

TABLE 59 (continued)

Fiscal Year	Surface Type	Type of Expenditure 1/	Length	Average Width	Equip. Parts O.H. Etc.	General Supervision	Roadside Development	Right of Way Fence	Campsites	Supervision	Insurance	Distribution of Supplies	Shops, Equip. Etc.	Administration	Total Cost Per Mile
		1	220.392	20.87	22.05	6.47		0.01		5.09	4.52	1.35	14.84	4.86	185.39
		2	220.392	20.87				0.07		0.59	1.22	0.37	3.84	1.17	45.19
	Graded &	3	220.392	20.87						0.37	0.88	0.26	2.78	0.78	32.67
	Dreined	4	220.392	20.87	22.05	6.47		0.08		6.05	6.62	1.96	21.26	6.61	263.25
		1	454.609	18.07	34.47	3.85		0.01		4.39	6.50	1.96	20.68	6.55	248.55
		2	454.609	18.07						0.38	0.37	0.11	1.14	0.36	13.63
	Grevel	3	454.609	18.07						0.12	0.33	0.10	1.02	0.32	12.06
	Surfaced	4	454.609	18.07	34.47	3.85		0.01		4.89	7.20	2.17	22.84	7.23	274.24
		1	2,634.821	19.80	32.37	4.30	0.65	0.10		3.75	7.05	2.12	22.36	6.90	261.20
	Low Type	2	2,634.821	19.80			0.06	1.01		1.15	1.35	0.41	4.26	1.31	50.33
	Bituminous	3	2,634.821	19.80						0.42	1.67	0.50	5.19	1.61	61.10
	Surfecing	4	2,634.821	19.80	32.37	4.30	0.71	1.11		5.32	10.07	3.03	31.81	9.82	372.63
		1	1,288.410	19.21	39.06	3.40	1.10	0.56		4.06	8.61	2.58	27.23	8.38	318.65
	High Type	2	1,288.410	19.21			0.67	3.13		1.18	1.10	0.43	3.46	1.08	41.47
	Bituminous	3	1,288.410	19.21	0.02	0.22	0.21			0.54	1.08	0.32	3.37	1.05	39.85
	Paving	4	1,288.410	19.21	39.08	3.62	1.98	3.69		5.78	10.79	3.33	34.06	10.51	399.97
		1	34.530	21.64	52.65	0.87	25.20			4.17	13.50	4.05	42.33	13.00	496.54
		2	34.530	21.64			34.26			1.97	3.45	1.01	10.69	3.30	126.88
	Concrete	3	34.530	21.64											
	Paving	4	34.530	21.64	52.65	0.87	59.46			6.14	16.95	5.06	53.02	16.30	623.42
		1	10.903	22.20	49.80	5.41	33.20			3.94	10.91	3.39	34.58	10.73	404.72
		2	10.903	22.20						0.09			0.09		1.28
	Bituminous	3	10.903	22.20											
	Macadam	4	10.903	22.20	49.80	5.41	33.20			4.03	10.91	3.39	34.67	10.73	406.00
		1	4,643.665	19.47	34.14	4.08	0.94	0.21		3.97	7.37	2.21	23.35	7.24	274.38
		2	4,643.665	19.47			0.47	1.44		1.06	1.19	0.38	3.75	1.16	44.48
		3	4,643.665	19.47	0.01	0.06	0.06			0.42	1.32	0.40	4.11	1.27	48.46
1936	Composite	4	4,643.665	19.47	34.15	4.14	1.47	1.65		5.45	9.88	2.99	31.21	9.67	367.32
		1	2,271.704	21.17	12.73	4.25	0.75	0.01		7.57	3.87	0.75	21.38	5.94	198.16
		2	2,271.704	21.17				0.01		0.79	0.62	0.09	2.67	0.85	28.68
	Graded &	3	2,271.704	21.17				0.26		0.53	0.59	0.06	3.20	0.75	30.99
	Dreined	4	2,271.704	21.17	12.73	4.25	0.75	0.28		8.89	5.08	0.90	27.25	7.54	257.83
		1	9,169.961	15.80	18.20	4.30	0.01			6.81	4.94	0.80	24.51	7.41	243.49
		2	9,169.961	15.80						0.72	0.36	0.07	1.50	0.53	17.59
	Grevel	3	9,169.961	15.80						0.65	0.52	0.07	2.48	0.81	31.11
	Surfaced	4	9,169.961	15.80	18.20	4.30	0.01			8.18	5.82	0.94	28.49	8.75	292.19
		1	7,258.435	19.80	28.65	4.02	0.42	0.04		4.30	6.43	1.56	24.56	8.27	267.23
	Low Type	2	7,258.435	19.80			0.02	0.42		1.23	1.36	0.30	4.95	1.75	59.11
	Bituminous	3	7,258.435	19.80			0.02			0.57	1.24	0.26	4.51	1.47	53.50
	Surfecing	4	7,258.435	19.80	28.65	4.02	0.46	0.46		6.10	9.03	2.12	34.02	11.49	379.84
		1	5,004.886	18.92	31.56	5.82	1.33	0.27	0.02	4.25	7.22	1.64	28.57	9.63	301.03
	High Type	2	5,004.886	18.92			0.17	0.90		1.63	0.98	0.27	3.56	1.29	44.04
	Bituminous	3	5,004.886	18.92		0.10	0.05			0.53	1.06	0.24	3.91	1.46	47.14
	Paving	4	5,004.886	18.92	31.56	5.92	1.55	1.17	0.02	6.41	9.26	2.15	36.04	12.38	392.21
		1	229.016	20.01	36.51	8.69	16.33			5.21	11.99	1.91	42.17	15.16	495.21
		2	229.016	20.01			5.17			1.02	0.78	0.20	2.81	0.93	30.43
	Concrete	3	229.016	20.01						0.16	0.41	0.06	1.11	0.47	20.33
	Paving	4	229.016	20.01	36.51	8.69	21.50			6.39	13.18	2.17	46.09	16.56	545.97
		1	66.511	18.84	31.75	4.21	5.44			5.44	7.34	1.37	30.91	10.10	326.49
		2	66.511	18.84						0.53	0.07	0.02	0.37	0.14	4.30
	Bituminous	3	66.511	18.84						0.69	0.26		1.58	0.45	17.73
	Macadam	4	66.511	18.84	31.75	4.21	5.44			6.66	7.67	1.39	32.86	10.69	348.52
	Composite	1	11,441.665		17.11	4.29	0.16			6.96	4.73	0.79	23.89	7.12	234.50
	Graded &	2	11,441.665							0.73	0.41	0.07	1.73	0.59	19.77
	Drained &	3	11,441.665					0.05		0.63	0.53	0.07	2.62	0.80	31.09
	Greveled	4	11,441.665		17.11	4.29	0.16	0.05		8.32	5.67	0.93	28.24	8.51	285.36
	Surface														
	Concrete	1	12,558.848	19.45	29.97	4.82	1.10	0.13	0.01	4.30	6.85	1.60	26.51	8.95	285.16
	Bituminous	2	12,558.848	19.45			0.17	0.60		1.38	1.19	0.28	4.33	1.54	52.28
	or Oiled	3	12,558.848	19.45		0.04	0.03			0.55	1.15	0.25	4.19	1.44	50.18
	Surface	4	12,558.848	19.45	29.97	4.86	1.30	0.73	0.01	6.23	9.19	2.13	35.03	11.93	387.62
		1	24,000.513	17.91	23.84	4.57	0.65	0.07	0.01	5.57	5.84	1.21	25.26	8.08	261.03
1931	Composite	2	24,000.513	17.91			0.09	0.31		1.07	0.82	0.18	3.09	1.09	36.78
-	All Im-	3	24,000.513	17.91		0.02	0.02	0.02		0.59	0.85	0.16	3.44	1.13	41.06
1936	proved Types	4	24,000.513	17.91	23.84	4.59	0.76	0.40	0.01	7.23	7.51	1.55	31.79	10.30	338.87

Significant data deriving from the tabulation are as follows:

1. During the period 1931 through 1936 the riding surface has increased from 15.75 feet to 19.47 feet (24%).
2. General maintenance and special maintenance items in whole have increased 13%.
3. Surface maintenance items decreased 21%.
4. Maintenance expenditures on shoulders and ditches decreased 10%.
5. Maintenance expenditures on slides and washouts decreased 37%.
6. Maintenance expenditures on guard rails and guide posts increased 6%.
7. Maintenance expenditures on bridges increased 161%.
8. Maintenance expenditures on right-of-way fence increased to $1.65 per mile of maintained roadway.
9. All direct maintenance expenditures decreased 17%.
10. Maintenance expenditures or snow removal and sanding increased 151%.
11. Maintenance expenditures on signs and signals increased 144%.
12. Maintenance expenditures on centerline striping increased from an average cost of $0.02 per mile in 1932 to $4.11 per mile in 1936.
13. Maintenance expenditures on the erection of snow fence increased 160%.
14. All direct maintenance expenditures in the interest of traffic service increased 169%.
15. Indirect expenditures increased about 81%. In 1931, indirect expenditures comprised 18% of the total expenditure; in 1936 indirect costs comprised 29% of the total expenditure per mile.
16. Apparently maintenance costs are increasing as the surface type is bettered, however, it is found that expenditures in the interest of traffic service are the real source of increase in most instances.
17. On the average, direct expenditures in the interest of traffic service, general maintenance, traffic surveys, roadside beatuification and campsites comprise 72.6% of all expenditures.

The foregoing data apply to the tabulation, i.e. to a system constantly increasing in length and in surface width. With a view toward projecting an estimate as to maintenance costs in the future we must break these charges down into unit costs applicable in a forecast of maintenance expenditures. Further, as stated in Chapter V, we are progressing toward a situation where the whole of the Federal Aid System will be surfaced with a high type bituminous pavement, therefore, we are interested in such informative data as are included in the tabulation concerning this type of wearing course.

In the preparation of the forecast it is presumed that the following charges may be allocated on a linear mile basis.

(1) Maintenance of shoulders and ditches.
(2) Repair of slides and washouts.
(3) Traffic service, including maintenance of guard fence and guide posts, the installation and maintenance of signs and signals and costs incident to painting the center-line stripe.
(4) Miscellaneous charges including the maintenance of bridges, traffic counts and surveys, roadside development, right-of-way fence, campsites and the distribution of supplies.

Other items of expenditure which may be allocated on a square yard basis are as follows:

(1) Surface maintenance
(2) Traffic service, including snow removal and sanding and the erection of snow fence.
(3) General overhead and equipment including rentals, light, heat, etc., equipment parts, overhaul etc., insurance and shops, equipment, etc.
(4) Administration.
(5) All supervision.

On tabulation of computations respecting cost allocations, we have results as follows:

TABLE 60 A
SHOWING COST OF MAINTENANCE ITEMS AS LISTED FOR HIGH TYPE BITUMINOUS PAVING
ALLOCATED ON A MILEAGE BASIS, AND TRENDS THEREFOR

Year	Shoulders & Ditches		Slides & Washouts		Traffic Service		Miscellaneous Activities		Total all Costs on Linear Basis	
	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost
1931	$65.93	$64.81	$14.73	$11.93	$10.42	$13.54	$0.82	$ 0.53	$91.90	$90.81
1932	47.98	59.33	11.00	10.17	16.12	17.66	0.44	1.79	75.54	89.95
1933	59.27	56.65	7.56	9.31	16.73	19.68	2.71	4.79	86.27	90.43
1934	65.28	55.07	6.53	8.80	26.60	20.87	5.42	6.56	103.83	91.30
1935	52.44	54.01	10.11	8.46	12.99	21.67	7.79	7.74	83.33	91.88
1936	$50.14	53.26	$ 8.42	8.22	$12.74	22.23	$9.67	6.56	$ 80.97	92.27
1937		52.73		8.05		22.62		9.14		92.54
1938		52.35		7.93		22.89		9.55		92.72
1939		52.08		7.84		23.06		9.83		92.83
1940		51.90		7.78		23.21		10.03		92.92
1941		51.77		7.74		23.30		10.17		92.98
1942		51.68		7.71		23.36		10.27		93.02
1943		51.62		7.69		23.40		10.34		93.05
1944		51.58		7.68		23.43		10.39		93.08
1945		51.55		7.67		23.45		10.43		93.10
1946		51.53		7.67		23.46		10.46		93.12
1947		51.52		7.67		23.47		10.48		93.14
1948		51.51		7.67		23.47		10.49		93.14
1949		51.51		7.67		23.47		10.50		93.15
1950		$51.51		$ 7.67		$23.47		$10.50		$93.15

TABLE 60 B
SHOWING COST OF MAINTENANCE ITEMS AS LISTED FOR HIGH TYPE BITUMINOUS PAVING
ALLOCATED ON A SQUARE YARD BASIS, AND TRENDS THEREFOR.

Year	Surface Maintenance		Traffic Service		General Overhead & Equipment		Administration		All Supervision		All Maintenance on Square Yard Basis	
	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost	Recorded Cost	Trend in Cost
1931	$0.01388	$0.01311	$0.00181	$0.00030	$0.00326	$0.00397	$0.00075	$0.00083	$0.00159	$0.00167	$0.02129	$0.01986
1932	0.01397	0.01243	0.00219	0.00149	0.00612	0.00560	0.00124	0.00092	0.00126	0.00128	0.02478	0.02172
1933	0.00907	0.01211	0.00106	0.00205	0.00652	0.00637	0.00069	0.00097	0.00103	0.00109	0.01837	0.02259
1934	0.01305	0.01193	0.00149	0.00238	0.00660	0.00681	0.00074	0.00100	0.00113	0.00099	0.02301	0.02311
1935	0.01196	0.01181	0.00239	0.00259	0.00711	0.00710	0.00150	0.00101	0.00098	0.00091	0.02394	0.02342
1936	$0.01169	0.01172	$0.00344	0.00274	$0.00731	0.00731	$0.00084	0.00102	$0.00077	0.00087	$0.02405	0.02366
1937		0.01166		0.00265		0.00745		0.00103		0.00083		0.02382
1938		0.01162		0.00293		0.00755		0.00104		0.00081		0.02395
1939		0.01159		0.00298		0.00762		0.00104		0.00079		0.02402
1940		0.01157		0.00301		0.00767		0.00105		0.00078		0.02406
1941		0.01155		0.00304		0.00771		0.00105		0.00077		0.02412
1942		0.01154		0.00306		0.00773		0.00105		0.00076		0.02414
1943		0.01154		0.00307		0.00775		0.00105		0.00076		0.02417
1944		0.01153		0.00308		0.00776		0.00105		0.00075		0.02417
1945		0.01153		0.00309		0.00777		0.00105		0.00075		0.02419
1946		0 01152		0.00309		0.00778		0.00105		0.00075		0.02419
1947		0.01152		0.00309		0.00778		0.00105		0.00075		0.02419
1948		0.01152		0.00310		0.00779		0.00105		0.00075		0.02421
1949		0.01152		0.00310		0.00779		0.00105		0.00075		0.02421
1950		$0.01152		$0.00310		$0.00779		$0.00105		$0.00075		$0.02421

Applying these data with respect to maintenance costs of high type bituminous paving ranging in width from 18 to 24 feet, we find that over-all costs will increase. In accord with the trends, surface maintenance, repair of slides and washouts, maintenance of shoulders and ditches and supervision will probably decrease in cost Traffic service, miscellaneous activities, general overhead and equipment and administration costs will probably show an increase. These points of information are shown graphically on Plates XXIV A, B, C, and D as follows:

PLATE XXIV-A

Showing Maintenance Costs For An Eighteen Foot Surfaced Width Of High Type Bituminous Paving & Trends Therefor

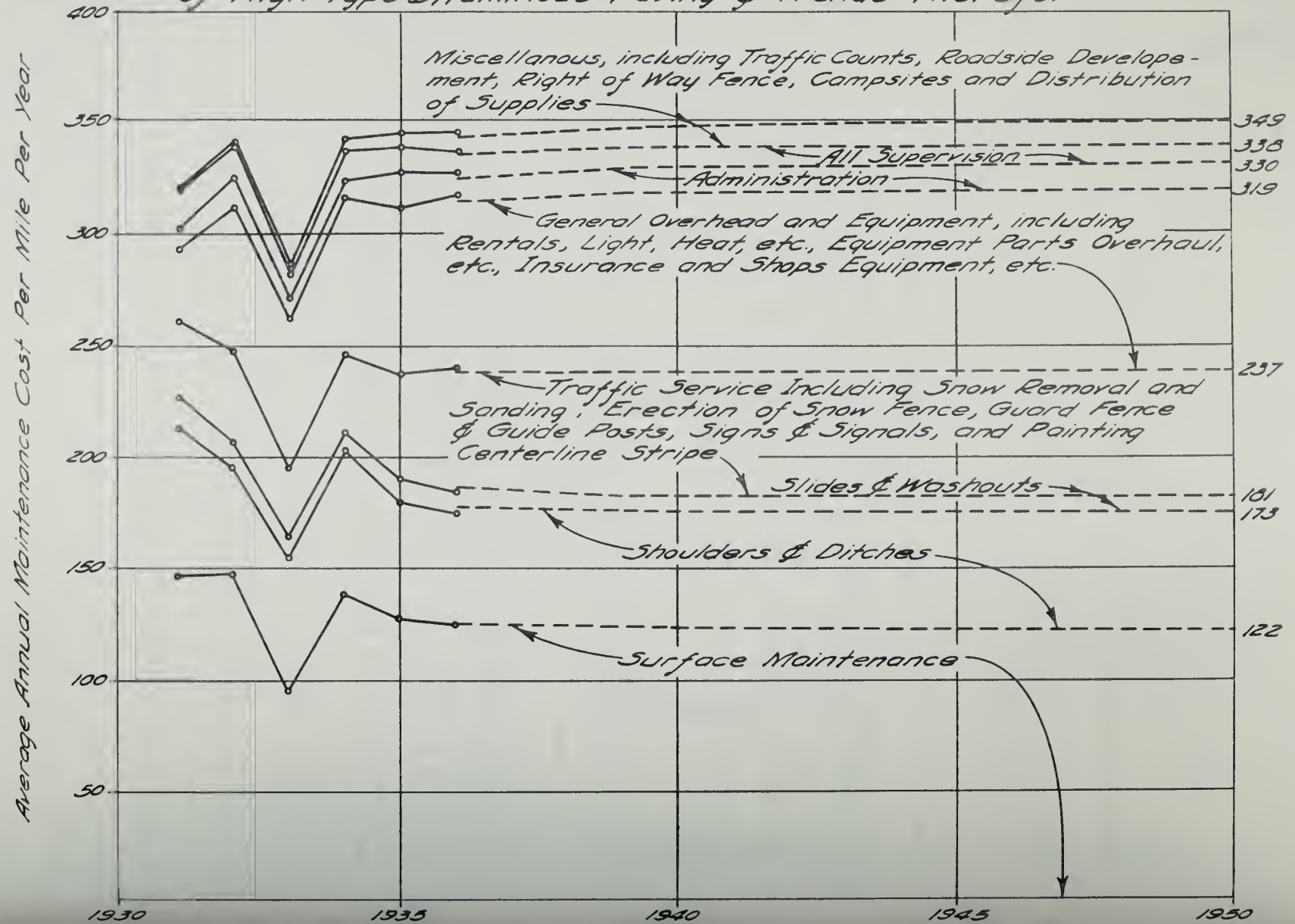


PLATE XXIV-B

Showing Maintenance Costs For A Twenty Foot Surfaced Width Of High Type Bituminous Paving & Trends Therefor

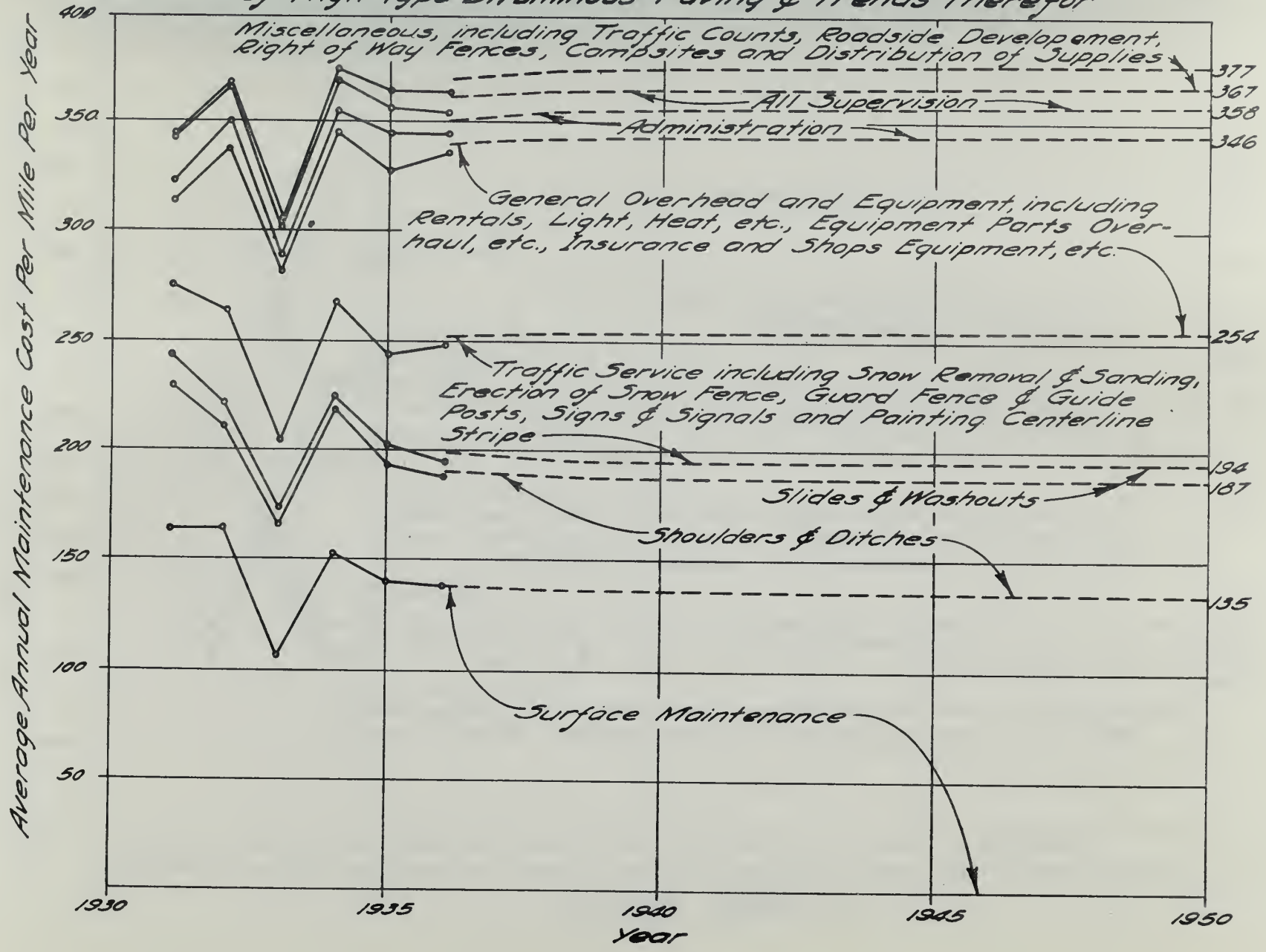


PLATE XXIV-C

Showing Maintenance Costs For A Twenty-Two Foot Surfaced Width Of High Type Bituminous Paving & Trends Therefor

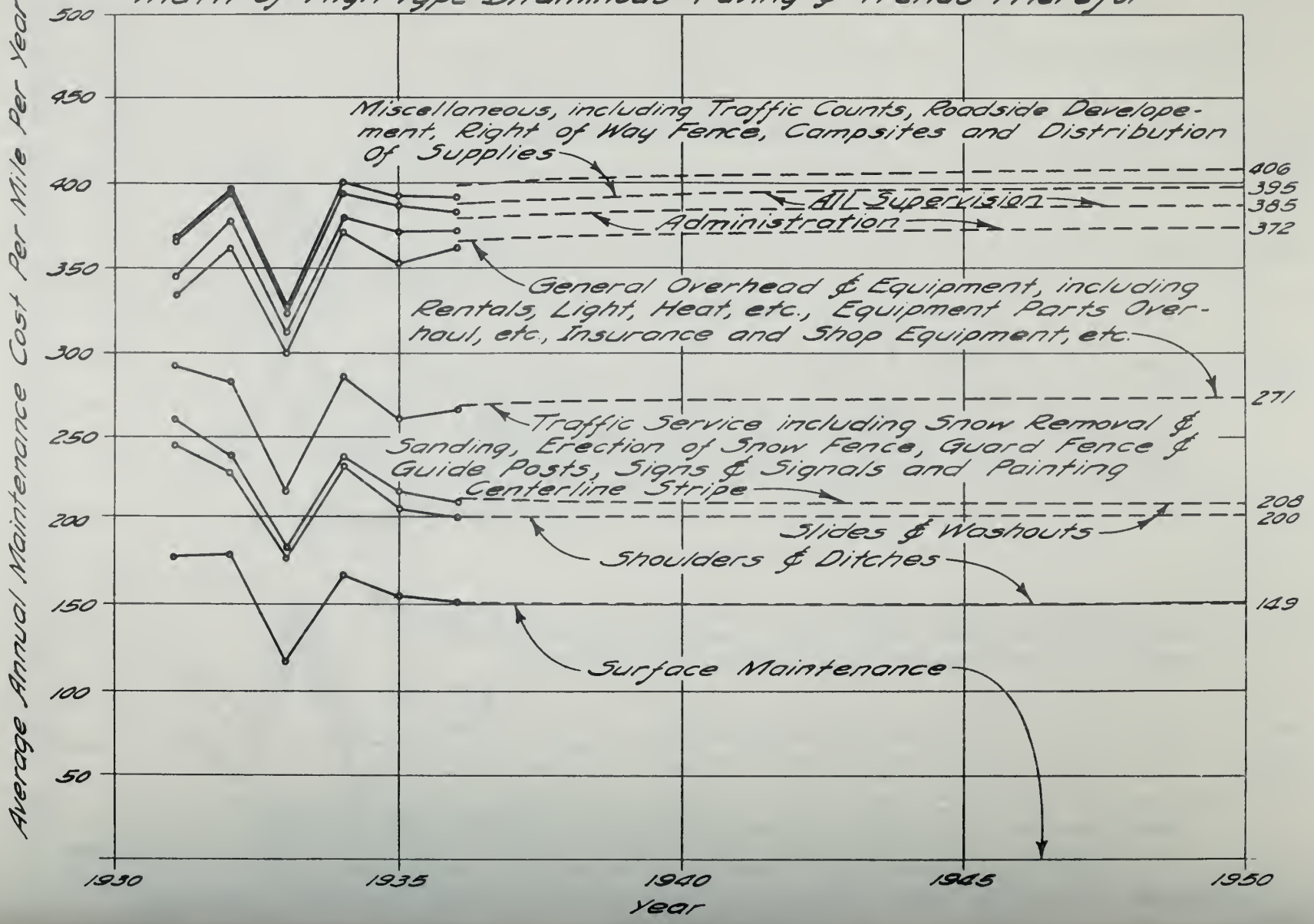
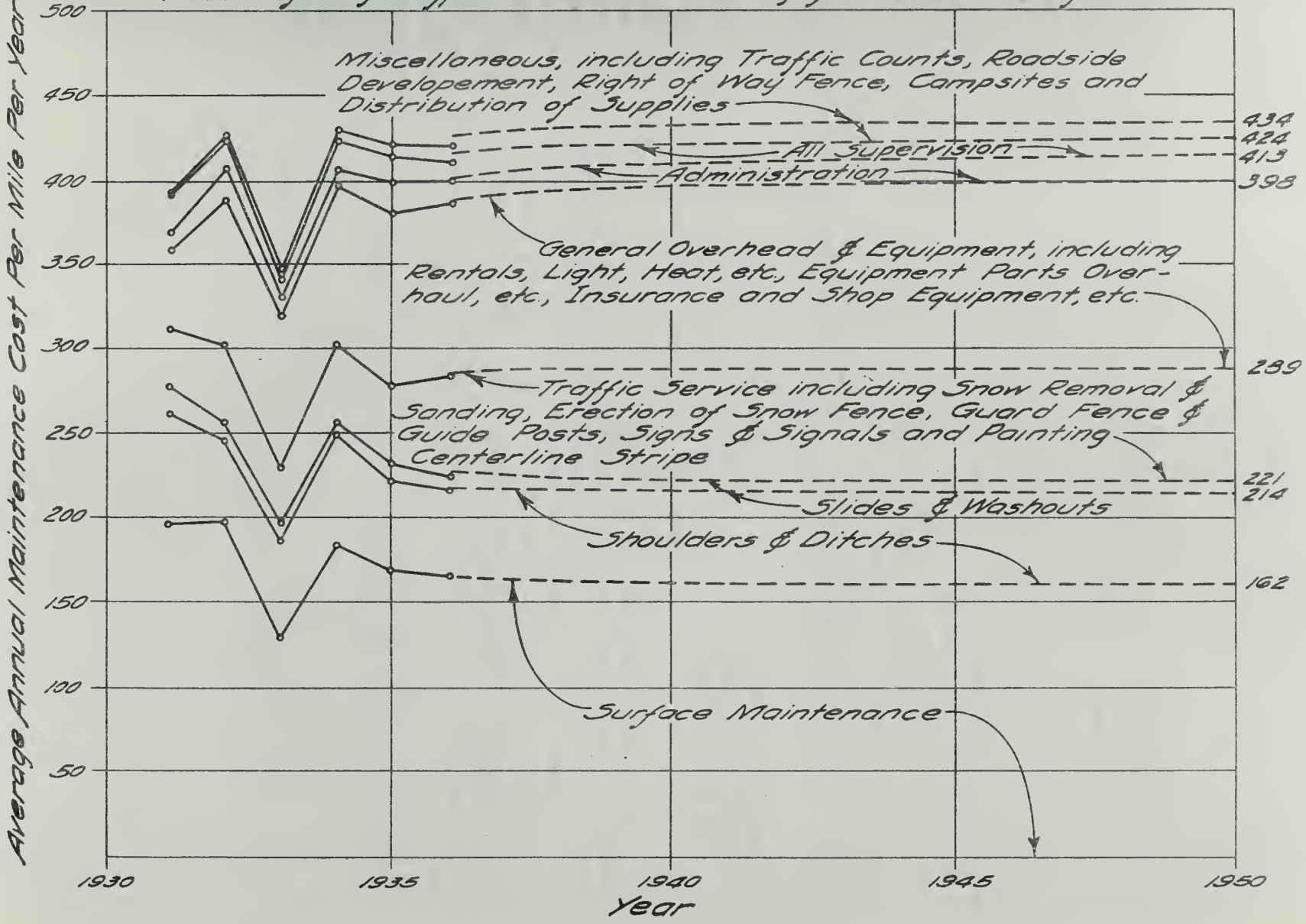


PLATE XXIV - D

Showing Maintenance Costs For A Twenty-Four Foot Surfaced Width Of High Type Bituminous Paving & Trends Therefor



According to the graphs we may reasonably expect that the annual maintenance cost for high type bituminous paving, for each of several widths, to be as follows:

18' width,	$349.00
20' width,	377.00
22' width,	406.00
24' width,	434.00

8.02--Costs incident to the Development of the State Secondary System

Construction and reconstruction costs incident to the development of the State Secondary System to the standards of width proposed in Chapter V, would approximate those costs advanced in Section 8.01. Under the provisions of the several programs affecting construction of the secondary or feeder system, the counties have agreed to maintain those state built sections located within each of the several counties with the notable exception of the West Gallatin Highway in Gallatin county (61.7 miles) which is administered by the Montana Highway Department at costs comparable to those outlined in Caption B, Section 8.01. The balance of the system is maintained with funds having origin with the motor vehicle license tax and the general property tax. No precise data are available concerning allocation of these funds within the counties. It is presumed, however that the several administrative bodies would construct and maintain their roads in such a manner as to serve traffic equitably, i.e. roads serving the greatest amount of traffic would be maintained to a higher standard with a resultant higher maintenance cost.

8.03--Costs Incident to the Development of the Land Service System

A. County Roads

By reference to Chapter XI we find that expenditure for roads and bridges, made by the several authorized agencies of the counties, amounted to $4,429,073, of which $1,571,445 were in debt service, leaving $2,857,628 as a direct expenditure for the upkeep of the county road system. The county road system, for purposes of this discussion, includes all public roads constructed and maintained by the county agencies and all NRS, WPSS, WPMS, WPGS and original Federal Aid projects not included in the Federal Aid System for which the several counties are responsible for maintenance although funds for the construction of these sections were drawn originally from sources other than the county road funds. As regards construction costs of county roads having a concrete surface or a low type bituminous surface, it is estimated that these costs will approximate those set forth under Caption A, Section 8.01 of this Chapter, the original construction cost being amortized over a thirty year period. Page 8-21, Table 61, only indicates roads constructed by the State or federal agencies and an agreement has been made with the counties to maintain these sections. The cost per mile for maintenance of different surface types is an estimated figure based on the cost per mile experienced by the State on similar types of roads irrespective of traffic. It is further assumed that these costs represent a primary obligation to the several counties affected and are listed hereafter in tabular form:

TABLE 61
SHOWING ROADS MAINTAINED BY COUNTY AGENCIES WHICH INVOLVED ORIGINAL EXPENDITURE IN PART OR IN WHOLE BY STATE AND FEDERAL AGENCIES CLASSIFIED BY AVERAGE TRAFFIC VOLUMES.

Surface Type	Type of Expenditure 1/	Traffic Volume Groups										Total Mileage & Average Costs
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	500 - 599	600 - 699	1250 - 1499	
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
			0.5	0.3	0.5		2.7	0.2				1.1	5.3
	1		310	310	310		310	310				310	310
	2		1,000	1,000	1,000		259						377
Standard	3		1,310	1,310	1,310		569						687
Concrete	4						741	1,000				1,000	623
Paving	5		$1,310	$1,310	$1,310		$1,310	$1,310				$1,310	$1,310
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
									6.2				6.2
Standard	1								310				310
High	2												
Type	3								310				310
Bituminous	4								638				638
Paving	5								$ 948				$ 948
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
				4.1	4.9	55.1	38.5	10.1	5.5	15.1			133.3
Standard	1			296	296	296	296	296	296	296			296
Low	2			525	344	452	139	249	180				282
Type	3			821	640	748	435	545	476	296			578
Bituminous	4			56	237	129	442	332	401	581			299
Surfacing	5			$ 877	$ 877	$877	$877	$877	$877	$877			$877
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Standerd			11.9	22.7	229.3	69.3	4.2		3.3				340.7
Plain	1		273	273	273	273	273		273				273
Macadam	4		473	473	473	473	473		473				473
Surfacing	5		$746	$746	$746	$746	$746		$746				$746
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Standerd		4.3	1.5	15.1	26.1	14.4	0.1						61.5
Plain													
Gravel	1	273	273	273	273	273	273						273
Surfacing	4	395	395	395	395	395	395						395
	5	$668	$668	$668	$668	$666	$668						$668
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		4.3	13.9	42.2	260.8	138.8	45.5	10.3	15.0	15.1		1.1	547.0
	1	273	274	275	274	282	295	296	297	296		310	280
	2		36	58	8	179	133	244	66				72
All	3	273	310	333	282	461	428	540	363	296			352
Standard	4	395	448	401	460	326	463	345	515	581		1,000	425
Construction	5	$668	$758	$734	$742	$789	$891	$885	$878	$877		$1,310	$777

1/ Legend as follows:
1. Average maintenance expenditure per mile by county agencies.
2. Average construction expenditure per mile by county agencies.
3. Average construction-maintenance expenditure per mile by county agencies.
4. Average construction expenditure per mile by State and Federal agencies.
5. Total expenditure per mile by all agencies.

We find this primary obligation to be $192,544 (352 x 547.0). Expenditures of the State and Federal agencies for construction of these sections amounts to $232,475 per year on the basis of a thirty year amortization period.

Subtracting $192,544 from the total of the direct expenditure, $2,857,628, we have a remainder of $2,665,084 for expenditure on county roads other than those listed herebefore the total length being 56,291.2 miles. We have no factual data concerning the annual costs of the several surface types in use on these sections of the county system. We have knowledge, however, of trends or tendencies on the part of the county road authorities in matters of road construction and maintenance as they are affected by topography and industry in the state, which lead or point to estimates as to the cost of the county road system. These data which we deem to be significant with respect to the allocation of county road funds are as follows:

1. County road work by the usual definition may be classed generally as maintenance work, with the exception, however, that this work usually results in some betterment resulting in continued improvement as the time progresses. In other words the roads approach completion as a circumstance of continued maintenance operations and there is no clear cut construction work involved on the bulk of the county road system. To avoid confusion in later sections of this discussion we will therefore use the term "construction-maintenance" to indicate county road work.

2. Some counties are fortunate in that gravel is readily available for road building purposes, other counties have only inferior local building materials. The latter condition occurs generally throughout the eastern section of the state, particularly in those areas devoted to extensive farming operations where an extended gridwork of roads is necessary to provide for traffic. In serving such traffic the county authorities are forced to "stretch" their revenues over a lengthy system with the result that funds are not available usually to provide a high standard road; the principal effort is then bent on maintaining existing roads in a passable condition. In such counties the road inventory shows a preponderance of unimproved roads. In the western part of the state and other counties which have access to gravels we find usually a shorter mileage along with equal or greater revenues to facilitate development of the county road systems. As a consequence of these variations in the county highway economy, the individual county methods in financing and developing their systems are not readily susceptible to comparison one with another. If however, we group the counties according to their status with respect to an ideal system, say one completely surfaced with a bituminous wearing course, we find categorical similarities in matters of county road costs.

To resolve the several counties into improvement status categories this office enters into the realm of conjecture by first eliminating those sections of the county system which were constructed with the aid of Federal monies or which had been previously oiled or paved by the counties; these sections represent those standardized improved roads for which the counties are primarily obligated in the expenditure of road funds as brought out earlier in this discussion. The remaining portion of the county roads represents a system constructed and maintained wholly by the county boards and this section of the system furnishes the basis for rendering the comparison of the several counties with respect to status in improvement. If, as we stated previously a bituminous surface treated system represents the ideal condition, the other surface types could be rated in accord therewith and from data set forth in earlier sections of this Chapter we find the annual costs and comparison thereof in factors of percentage to be as follows:

Surface Type	Annual Cost	Percentage Factor
Bituminous Surface Treatment	$ 877.00	100%
Plain Macadam Surfacing	746.00	85%
Plain Gravel Surfacing	668.00	76%
Graded & Drained Earth	587.00	67%

Unimproved roads are estimated to be twenty percent complete and primitive roads are estimated to be ten percent complete with respect to the ideal surface type to complete the picture.

As an example we will compute the estimated status of improvement of the county road system in Flathead county.

Flathead County

Total mileage of all county roads classified by surface type 1/		Excluding those standardized sections for which funds are primarily obligated	Leaving a county road system classified as follows:	Percentage Factor	Equivalent Mileage in terms of ideal surface
Surface Type	Miles	Miles	Miles		
Low Type Bit.	3.7	3.7	0.0		
Plain Macadam	149.1	18.5	130.6	85.0%	111.0
Plain Gravel	155.0	2.4	152.6	76.0%	116.0
Graded & Drained	9.6	0.0	9.6	67.0%	6.4
Unimproved	361.8	0.0	361.8	20.0%	72.4
Primitive	63.5	0.0	63.5	10.0%	6.3
All Surface Types	742.7	24.6	718.1		312.1

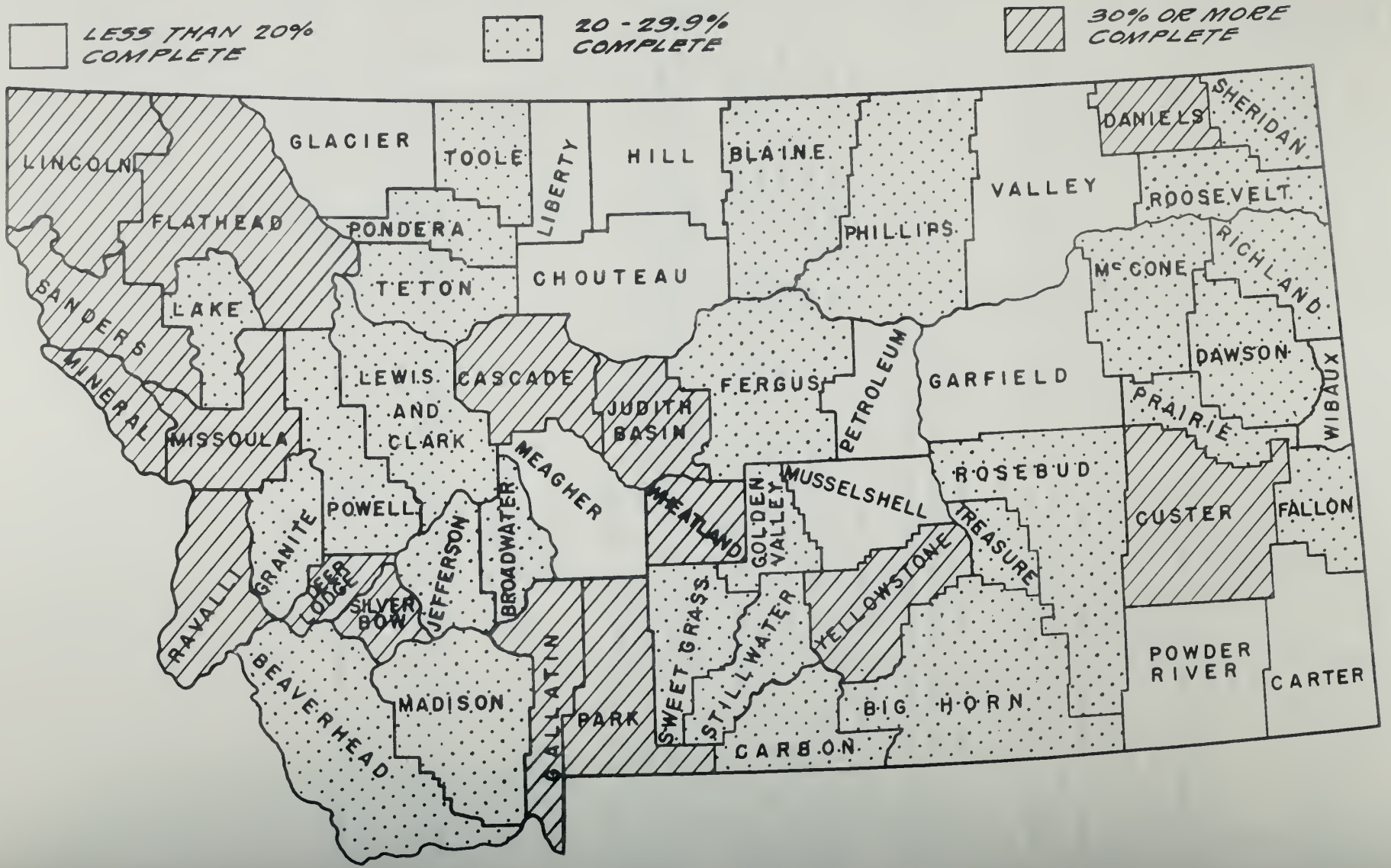
1/ Including all roads constructed and maintained by the county and those roads built with participating Federal funds for which the county is obligated in maintenance.

Continuing the example, we find that 130.6 miles of plain macadam surfacing are equivalent in status of improvement to 111.0 miles of ideally surfaced roads, low type bituminous in this case. Nine and six-tenths of graded and drained earth road are equivalent in status of improvement to 6.4 miles of ideally surfaced road. Dividing 312.1 by 718.1 we find the county roads as a whole in Flathead county to be 43.46% complete with respect to an hypothetical ideally surfaced county system in that county.

If next we resolve the inventory data for all counties in the state into equivalent mileages and group them in accord with their status in improvement, low, less than 20% complete, medium, 20% to 30% complete, and high, 30% or more complete, we have a picture in composite as shown on Plate XXV.

PLATE XXV

SHOWING STATUS OF IMPROVEMENT OF THE COUNTY ROADS IN THE COUNTIES OF THE STATE OF MONTANA



Continuing the discussion and turning once again to costs, it is estimated that the costs of the improved section of the county roads in each of the improvement categories will remain in accord with the improvement percentage factors listed hereinbefore, however, in Flathead County the percentage cost factors of the unimproved and primitive roads will change to 15% and 5% respectively instead of the 20% and 10% estimated. To clarify this application we now set forth an example relating to county expenditures in Flathead County, wherein we derive costs for each surface type.

Surface Type	Miles 1/	Percentage cost factors 2/	Equivalent mileage on basis of cost factors 3/	Equivalent Mileage in respect to whole for each surface type 4/	Direct Expenditures on all roads 5/	Cost per mile for each surface type 6/	Total Estimated Cost 7/
Plain Macadam	130.6	85.0%	111.0	342.2		286.64	$37,436
Plain Gravel	152.6	76.0%	116.0	382.7		256.30	39,111
Graded & Drained	9.6	67.0%	6.4	434.2		225.95	2,169
Unimproved	361.8	15.0%	54.3	1,939.3		50.58	18,302
Primitive	63.5	5.0%	3.2	5,818.0		16.86	1,071
All roads	718.1	40.5%	290.9	718.1	$98,089	$136.60	$98,089

Explanation of the computations entering in the preparation of this table is as follows:

1/ Representing the mileage on the county road system which are constructed and maintained in whole by the county.

2/ Cost factors as set forth in the paragraph preceding the table.

3/ Equivalent mileage in respect to the ideal surface type.

4/ The equivalent mileages in column three when added totals 290.9 miles. Dividing 85, 76, 67, 15 and 5 into 100 we have results as follow: 1.1765, 1.3165, 1.4925, 6.6667 and 20.0000 respectively. Multiplying 290.9 by each of these factors we have results 342.2, 382.7, 434.2 etc., which represent equivalent mileages for each surface type in this hypothesis presuming the others do not exist. In other words, 290.9 miles represents a system having a low type bituminous surface equivalent in cost to a system 342.2 miles long having a plain macadam surface. By the hypothesis a primitive system 5,818 miles long would cost the same as the bituminized system 290.9 miles in length.

5/ The total direct expenditure on roads in Flathead county less that amount estimated to have been spent in standardized sections.

6/ These costs obtained by dividing $98,089 by 342.2, 382.7, 434.2, 1939.3, and 5818.0. Each one of these results when multiplied by the corresponding mileage in column 4/ will total 98,089.

7/ Total costs are obtained by multiplying the estimated cost per mile in column 6/ by the actual mileage as shown in column 1/.

The procedure was followed in estimating average costs for all the counties in the state, distribution being made to traffic volume groups in each of the improvement categories.

3. Normally, the expenditure of road funds in each of the several counties will follow the traffic volume. Given a road having a traffic volume of 50 vehicles per day per mile, the road authorities in the county would tend to spend more money on this interval than a road bearing but 5 vehicles per day per mile. In the first case undoubtedly the county commissioner would attempt to provide a gravelled road insofar as funds would permit. In general we find on review of inventory data that average annual costs increase with traffic use in each of the inprovement categories. For example, we find in Flathead county, 43.4 miles of plain macadam surfacing bearing traffic in the group 25-49, 87.2 miles in the group 50-99 and 0.1 miles in the group 200-299. On the other hand, Hill county having four times the total mileage along with lesser road revenues and less accessible road building materials has but 1.5 miles of plain macadam surfacing bearing traffic in the group 50-99. This comparison is rendered outside the respective improvement categories of the counties mentioned, however it brings out the point that expenditures follow traffic volume.

Keeping these three points as set forth hereinbefore in mind we have prepared an estimate of the average annual costs of the county roads in each of the improvement categories as follows: (It must be understood that the data set forth in the following tables and graphs are purely theoretical and no claim is here made as to their actual authenticity of supposition).

TABLE 62A
ESTIMATED ANNUAL COST OF CONSTRUCTION-MAINTENANCE IN THOSE COUNTIES ADJUDGED TO BE LESS THAN TWENTY PERCENT COMPLETE.

Surface Type	Classification of Expenditures	Traffic Volume Groups								Totals of Averages
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Macadam Surfacing			5.5	14.7	4.0	0.2				24.4
	Annual Average Cost Per Mile		135.00	147.00	156.00	170.00				$ 146.00
	Total Expenditure		$743.00	$2,161.00	$624.00	$ 34.00				$3562.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Gravel Surfacing		12.8	120.5	46.7	79.8	7.8	2.8			270.4
	Annual Average Cost Per Mile	109.00	121.00	133.00	143.00	157.00	171.00			130.55
	Total Expenditure	$1,395.00	$14,581.00	$6,211.00	$11,411.00	$1,225.00	$479.00			$35,302.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Graded & Drained		9.7	154.3	345.3	3.9	1.8				515.0
	Annual Average Cost Per Mile	106.70	111.75	116.70	120.70	125.70				115.09
	Total Expenditure	$1,035.00	$17,242.00	$40,297.00	$471.00	$226.00				$59,271.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Unimproved		1659.0	5505.6	114.1	4.0	3.9				7286.6
	Annual Average Cost Per Mile	15.55	28.57	37.55	49.55	56.55				$ 25.77
	Total Expenditure	$25,797.00	$157,276.00	$4,284.00	$198.00	$221.00				$187,776.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Primitive		8649.9								8649.9
	Annual Average Cost Per Mile	8.59								$ 8.59
	Total Expenditure	$74,303.00								$74,303.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Composite		10,331.4	5,785.9	520.8	91.7	13.7	2.8			16,746.3
	Annual Average Cost Per Mile	$ 9.92	$ 32.81	$ 101.68	$ 138.54	$ 124.53	$171.00			$ 21.51
	Total Expenditure	$102,530.00	$189,842.00	$52,953.00	$12,704.00	$1,706.00	$479.00			$360,214.00

TABLE 62B
ESTIMATED ANNUAL COST OF CONSTRUCTION-MAINTENANCE IN THOSE COUNTIES
ADJUDGED TO BE 20.0 - 29.9% COMPLETE

Surface Type	Classification of Expenditures	Traffic Volume Groups								Totals & Averages
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Macedam Surfacing		2.7	47.3	109.2	191.7	35.1	0.2			386.2
	Annual Average Cost Per Mile	116.47	158.47	173.47	184.47	198.47	225.47			$ 178.99
	Total Expenditure	$314.00	$7,496.00	$18,943.00	$35,363.00	$6,966.00	$ 45.00			$69,127.00
Plain Gravel Surfacing		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
			311.0	1,389.9	360.6	8.1	4.3	0.1		2,074.00
	Annual Average Cost Per Mile		145.46	158.46	177.46	196.46	212.46	221.46		$ 160.08
	Total Expenditure		$45,238.00	$220,244.00	$63,992.00	$1,591.00	$914.00	$ 22.00		$332,001.00
Graded & Drained		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		17.4	1,093.7	894.4	27.0	4.2	4.1	3.2		2,044.0
	Annual Average Cost Per Mile	122.92	134.92	147.92	161.92	169.92	177.92	185.92		$ 141.10
	Total Expenditure	$2,139.00	$147,562.00	$132,300.00	$4,372.00	$714.00	$729.00	$ 595.00		$288,411.00
Unimproved		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		2,891.1	11,979.7	345.0	2.0	0.3				15,218.1
	Annual Average Cost Per Mile	21.60	33.60	45.60	55.60	62.60				$ 31.60
	Total Expenditure	$62,448.00	$402,518.00	$15,732.00	$111.00	$19.00				$480,828.00
Primitive		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		9,352.9	4.1	1.7	3.5	1.5				9,363.7
	Annual Average Cost Per Mile	10.48	18.51	25.51	29.51	32.50				$ 10.51
	Total Expenditure	$98,132.00	$76.00	$43.00	$103.00	$49.00				$ 98,403.00
Composite		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		12,264.1	13,435.8	2,740.2	584.8	49.20	8.6	3.3		29,086.0
	Annual Average Cost Per Mile	$ 13.29	$ 44.87	$ 141.33	$ 177.74	$ 189.82	$ 196.28	$106.97		$ 43.62
	Total Expenditure	$163,033.00	$602,890.00	$387,262.00	$103,941.00	$9,339.00	$1,688.00	$617.00		$1,260,770.00

TABLE 62C
ESTIMATED ANNUAL COST OF CONSTRUCTION-MAINTENANCE IN THOSE COUNTIES
ADJUDGED TO BE 30.0% - OR MORE COMPLETE.

Surface Type	Classification of Expenditures	Traffic Volume Groups								Totals & Averages
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Macedam Surfacing			75.5	387.1	255.0	22.3				739.9
	Annual Average Costs Per Mile		208.00	263.00	327.00	365.00				$ 282.52
	Total Expenditure		$15,704.00	$101,807.00	$83,385.00	$8,140.00				$209,036.00
Plain Gravel Surfacing		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		0.5	206.0	1,090.6	213.2	35.2	0.3			1,545.8
	Annual Average Costs Per Mile	177.30	207.30	247.30	305.30	360.30	380.30			$ 252.55
	Total Expenditure	$ 89.00	$42,704.00	$269,705.00	$65,090.00	$12,683.00	$114.00			$390,305.00
Graded & Drained		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		2.0	520.0	13.4	8.2	2.3				545.9
	Annual Average Costs Per Mile	160.00	200.00	230.00	242.00	249.00				$ 201.43
	Total Expenditure	$320.00	$104,000.00	$3,082.00	$1,984.00	$573.00				$109,959.00
Unimproved		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		782.3	4,487.1	401.0		1.0				5,671.4
	Annual Average Costs Per Mile	41.60	51.60	67.60		92.60				$ 51.36
	Total Expenditure	$32,544.00	$231,534.00	$27,108.00		$93.00				$291,279.00
Primitive		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		1,954.2	0.2	0.2	0.4	0.9				1,955.9
	Annual Average Costs Per Mile	18.12	34.14	40.14	45.14	48.14				$ 18.14
	Total Expenditure	$35,401.00	$ 7.00	$ 8.00	$18.00	$43.00				$ 35,477.00
Composite		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
		2,739.0	5,288.8	1,892.3	476.8	61.7	0.3			10,458.9
	Annual Average Costs Per Mile	$ 24.96	$ 74.49	$ 212.29	$ 315.60	$ 348.98	$380.30			$ 99.07
	Total Expenditure	$68,354.00	$393,949.00	$401,710.00	$150,477.00	$21,532.00	$114.00			$1,036,136.00

TABLE 62D
ESTIMATED ANNUAL COST OF CONSTRUCTION-MAINTENANCE OF ALL
COUNTY ROADS IN MONTANA.

Surface Type	Classification of Expenditure	Traffic Volume Groups								
		0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	Totals & Averages
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Macadam Surfacing		2.7	128.3	511.0	450.7	57.6	0.2			1,150.5
	Annual Average Costs Per Mile	116.47	186.62	240.53	264.86	262.85	225.47			$ 244.87
	Total Expenditure	$314.00	$ 23,943.00	$122,911.0	$119,372.00	$15,140.00	$ 45.00			$281,725.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Plain Gravel Surfacing		13.3	637.4	2,527.2	653.6	51.1	7.4	0.1		3,890.2
	Annual Average Costs Per Mile	111.58	160.82	196.33	214.95	303.31	203.65	221.46		$ 194.77
	Total Expenditure	$1,484.00	$102,523.00	$496,160.00	$140,493.00	$15,499.00	$1,507.00	$ 22.00		$757,688.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Graded & Drained		29.1	1,768.0	1,253.1	39.1	8.3	4.1	3.2		3,104.9
	Annual Average Cost Per Mile	120.07	152.04	140.20	174.60	182.29	177.81	186.94		$ 147.39
	Total Expenditure	$3,494.00	$268,804.00	$175,679.00	$6,827.00	$1,513.00	$729.00	$595.00		$457,641.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Unimproved		5,332.4	21,972.4	860.1	6.0	5.2				28,176.1
	Annual Average Cost Per Mile	22.65	36.01	54.79	51.50	64.04				$ 34.07
	Total Expenditure	$120,789.00	$791,328.00	$47,124.00	$309.00	$333.00				$959,883.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Primitive		19,957.0	4.3	1.9	3.9	2.4				19,969.5
	Annual Average Costs Per Mile	10.01	19.30	26.84	31.03	38.33				$ 10.43
	Total Expenditure	$207,636.00	$83.00	$51.00	$121.00	$92.00				$208,183.00
		Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Composite		25,334.5	24,910.5	5,153.3	1,153.3	124.6	11.7	3.3		56,691.2
	Annual Average Costs Per Mile	$ 13.18	$ 46.42	$ 163.38	$ 231.62	$ 261.45	$ 194.46			$ 47.35
	Total Expenditure	$333,917.00	$1,156,661.00	$841,925.00	$267,122.00	$32,577.00	$2,281.00	$617.00		$2,685,120.00

Tr ... when ... sent ... as ... n Plat XX.1 A,B, & C.

PLATE XXXI

SKETCH SHOWING RELATIONSHIP OF ANNUAL AVERAGE COST OF CONSTRUCTION-MAINTENANCE ON COUNTY ROADS AND AVERAGE TRAFFIC VOLUME (PLAIN MACADAM SURFACING)

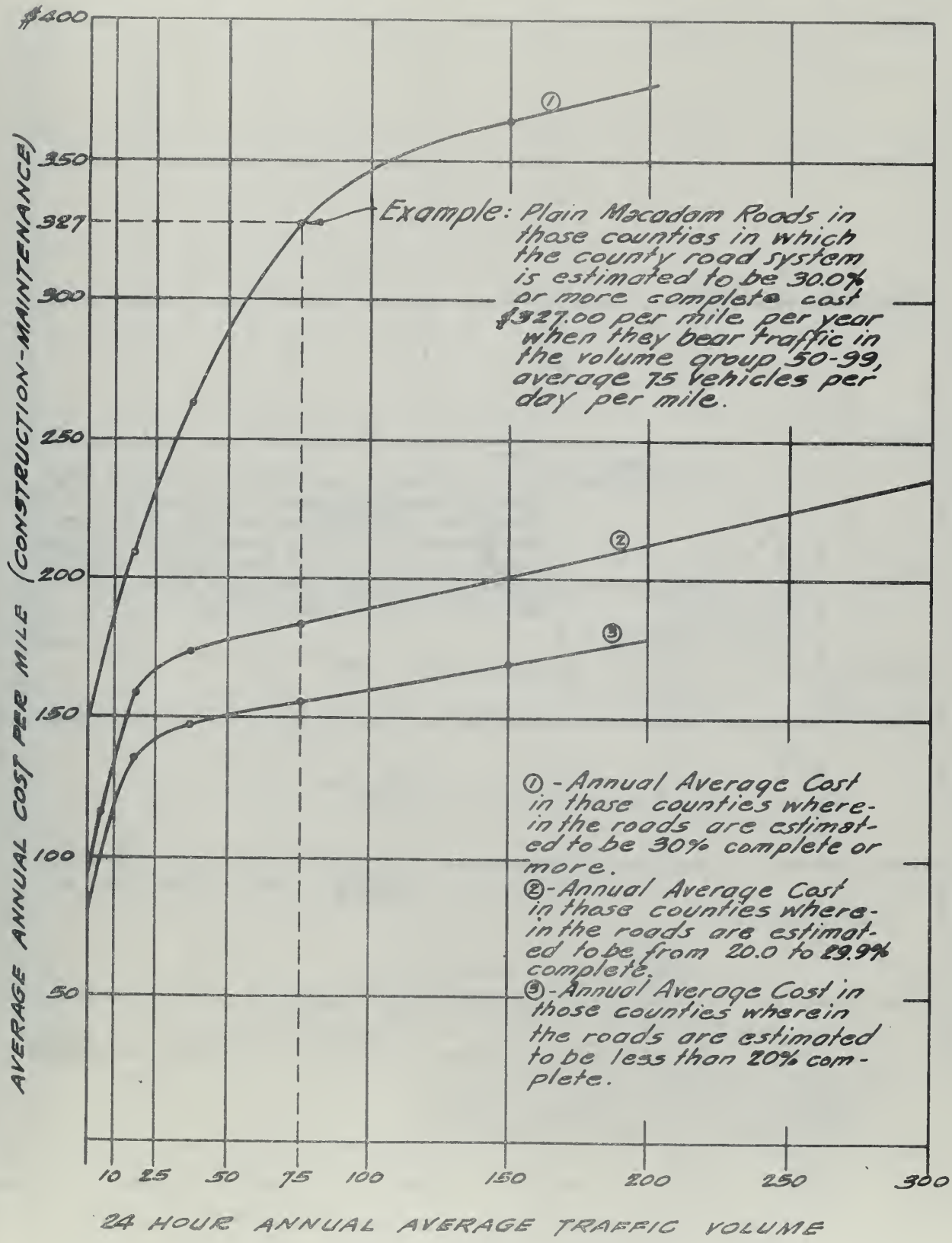

$400
350
327
300
250
200
150
100
50
AVERAGE ANNUAL COST PER MILE (CONSTRUCTION-MAINTENANCE)
Example: Plain Macadam Roads in those counties in which the county road system is estimated to be 30.0% or more complete cost $327.00 per mile per year when they bear traffic in the volume group 50-99, average 75 vehicles per day per mile.
①-Annual Average Cost in those counties wherein the roads are estimated to be 30% complete or more.
②-Annual Average Cost in those counties wherein the roads are estimated to be from 20.0 to 29.9% complete.
③-Annual Average Cost in those counties wherein the roads are estimated to be less than 20% complete.
10 25 50 75 100 150 200 250 300
24 HOUR ANNUAL AVERAGE TRAFFIC VOLUME

PLATE XXVI B

SKETCH SHOWING RELATIONSHIP OF ANNUAL AVERAGE COST OF CONSTRUCTION-MAINTENANCE ON COUNTY ROADS AND AVERAGE TRAFFIC VOLUME. (GRADED & DRAINED ROADS AND PRIMITIVE ROADS.)

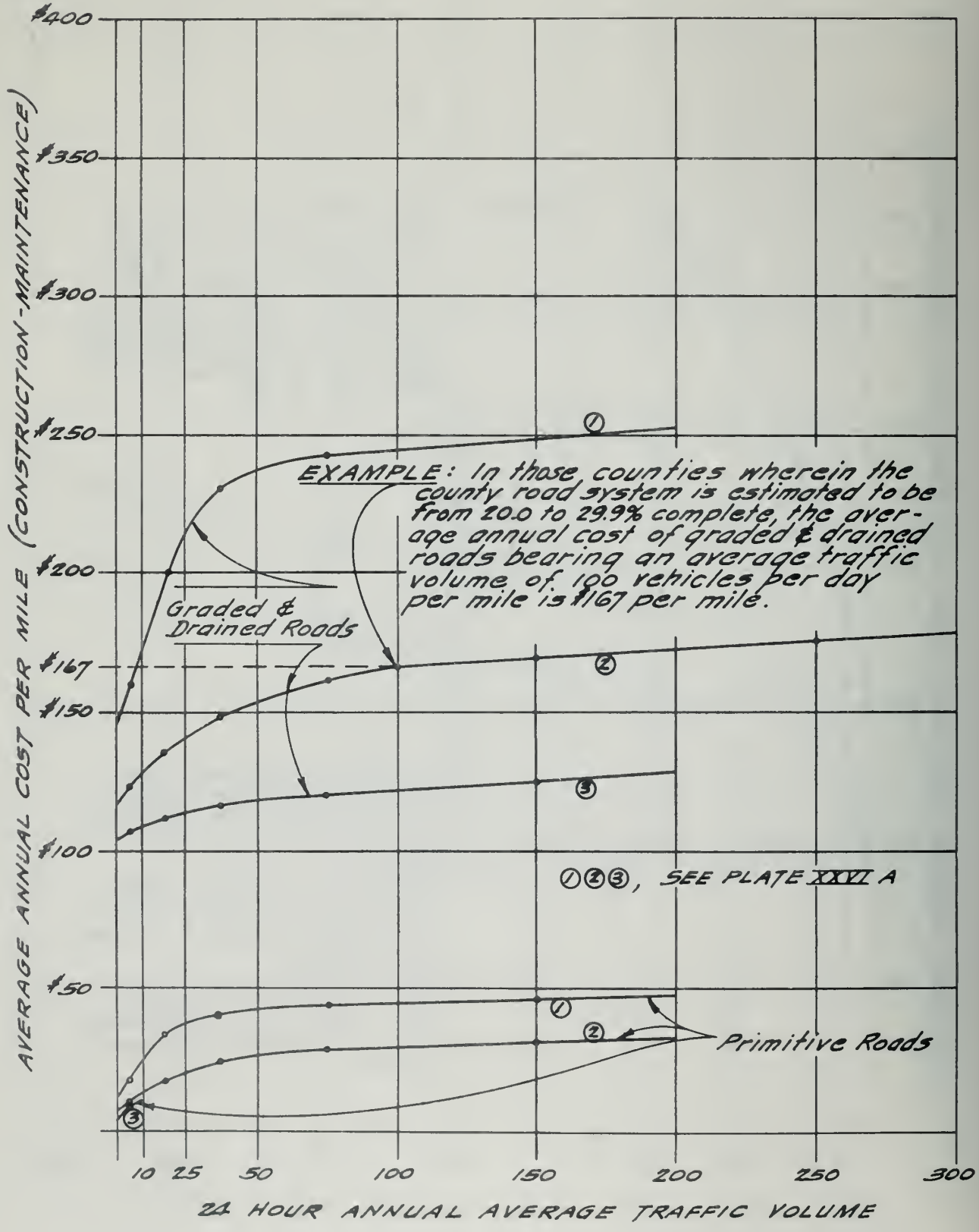
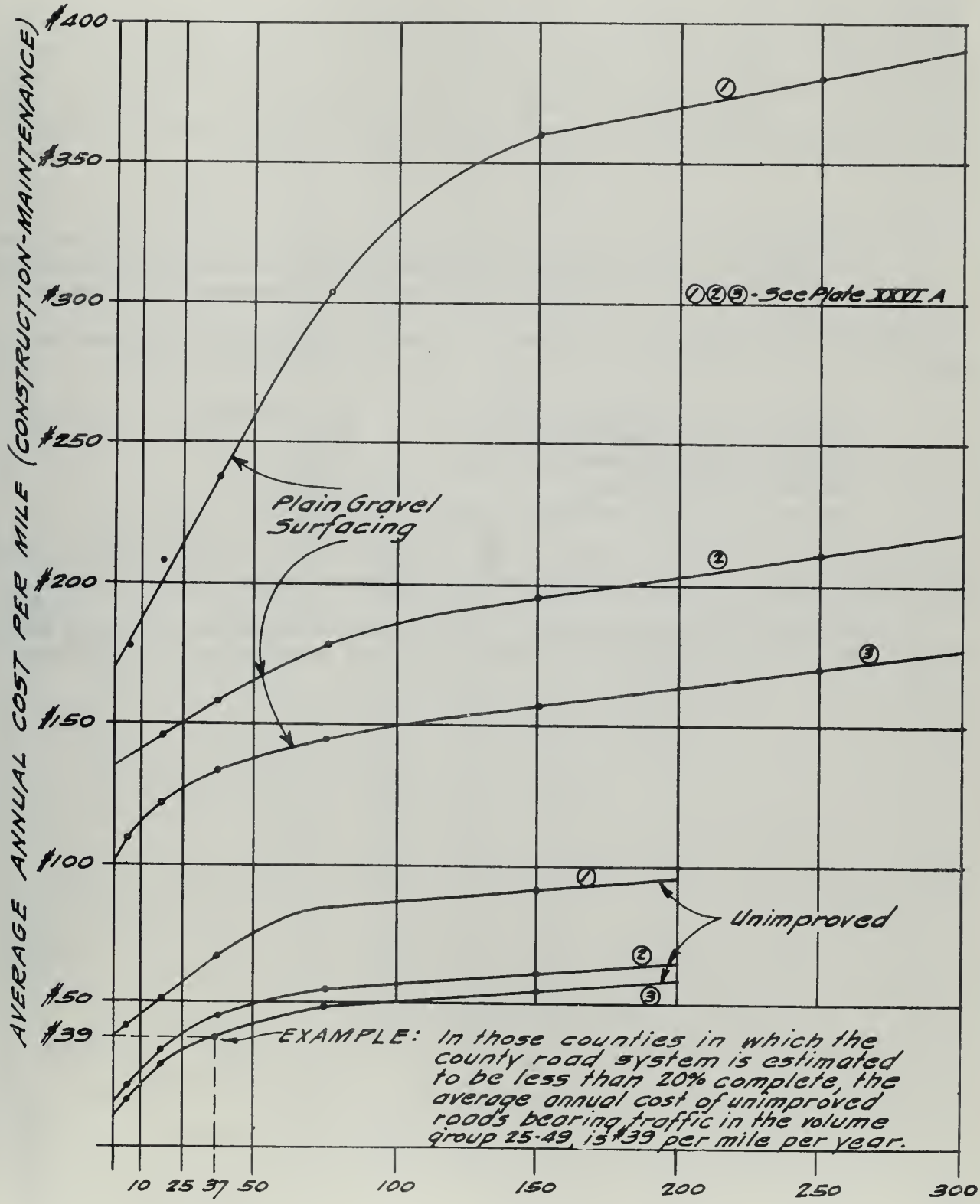

AVERAGE ANNUAL COST PER MILE (CONSTRUCTION-MAINTENANCE)
$400
$350
$300
$250
$200
$167
$150
$100
$50
EXAMPLE: In those counties wherein the county road system is estimated to be from 20.0 to 29.9% complete, the average annual cost of graded & drained roads bearing an average traffic volume of 100 vehicles per day per mile is $167 per mile.
Graded & Drained Roads
①②③, SEE PLATE XXVI A
Primitive Roads
10 25 50 100 150 200 250 300
24 HOUR ANNUAL AVERAGE TRAFFIC VOLUME

PLATE XXXI C

SKETCH SHOWING RELATIONSHIP OF ANNUAL AVERAGE COST OF CONSTRUCTION-MAINTENANCE ON COUNTY ROADS AND AVERAGE TRAFFIC VOLUME. (PLAIN GRAVEL SURFACING AND UNIMPROVED ROADS.)



All material set forth herebefore represents an estimate of the annual cost of the county road system in terms of "construction-maintenance". As stated in the first part of this section $1,571,445 of the total county road revenue in 1936 were applied in debt service. How much of this represents payment of interest and principle on previous county road construction and how much was applied on the debt incurred by the counties when they participated in construction along the Federal Aid System, we do not know. In any event a considerable portion of the payment in debt service represents an amortization payment which should be applied in previous calculation with respect to the direct annual cost of "construction-maintenance". In closing the section, therefore, it is incumbent on the writer to state that the cost estimates set forth in the discussion are not truly conclusive since they do not include funds set aside to pay off debts incurred in previous county road and bridge construction. If and when these debts are paid, the counties will undoubtedly apply all funds available in bettering the condition of the county road system thus increasing the unit costs by the amount of new revenue available.

B. Other Systems included in the Land Service System, including National Forest Highways, National Forest Development Roads, National Indian Reservation Roads, National Military Reservation Roads, and National Parks Highways.

Computing the status of improvement for each of these several systems as per the procedure set up in Caption A of this section, we have results as follow:

National Forest Highway System	26.2% complete
National Forest Development System	20.0% "
National Indian Reservation Roads	43.7% "
National Parks Highways	70.9% "
National Military Reservation Roads	20.0% "

Funds necessary for the construction and maintenance of these several systems derive from appropriations allocated to the administrative agencies as listed.

Annual "construction maintenance" costs for each of these several systems classified by surface types and traffic volume groups are estimated to be as follows:

TABLE 63
ESTIMATED ANNUAL COSTS OF CONSTRUCTION-MAINTENANCE OF ROAD SYSTEMS
INCLUDED IN THE LAND SERVICE SYSTEM

System	Surface Type	Classification of Expenditures	Traffic Volume Groups: 0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	Totals & Averages
National Forest Highway System	Plain Macadam Surfacing					2.0 Miles					2.0 Miles
		Annual Ave. Cost Per Mile				184.47					$184.47
		Total Expenditure				$369.00					$369.00
	Plain Gravel Surfacing			8.6 Miles	3.8 Miles						12.4 Miles
		Annual Ave. Cost Per Mile		145.46	158.46						$149.44
		Total Expenditure		$1,251.00	$602.00						$1,853.00
	Graded & Drained				1.2 Miles	1.2 Miles					2.4 Miles
		Annual Ave. Cost Per Mile			147.92	161.92					$ 155.00
		Total Expenditure			$178.00	$ 194.00					$ 372.00
	Unimproved		56.4 Miles	41.2 Miles	33.7 Miles	3.4 Miles	0.2 Miles				134.9 Miles
		Annual Ave. Cost Per Mile	21.60	33.60	45.60	55.60	62.60				$ 32.18
		Total Expenditure	$1,218.00	$1,384.00	$1,537.00	$189.00	$13.00				$4,341.00
	Composite		56.4 Miles	49.8 Miles	38.7 Miles	6.6 Miles	0.2 Miles				151.7 Miles
		Annual Ave. Cost Per Mile	21.60	52.91	59.87	113.94	62.60				45.72
		Total Expenditure	$1,218.00	$2,635.00	$2,317.00	$752.00	$13.00				$6,935.00
	Plain Macadam Surfacing		5.6 Miles	3.5 Miles	1.7 Miles	3.3 Miles	4.0 Miles	0.2 Miles	0.2 Miles	0.1 Miles	18.6 Miles
		Annual Ave. Cost Per Mile	116.47	158.47	173.47	184.47	198.47	225.47	252.47	2,794.7	$ 162.80
		Total Expenditure	$652.00	$ 555.00	$295.00	$609.00	$794.00	$ 45.00	$ 50.00	$ 28.00	$3,028.00
	Plain Gravel Surfacing		31.8 Miles	24.7 Miles	11.1 Miles	10.4 Miles					70.0 Miles
		Annual Ave. Cost Per Mile	136.00	145.46	158.46	177.46					$ 164.61
		Total Expenditure	$4,325.00	$3,593.00	$1,759.00	$1,846.00					$11,523.00
	Graded & Drained		13.8 Miles								13.8 Miles
		Annual Ave. Cost Per Mile	122.92								$ 122.92
		Total Expenditure	$1,696.00								$1,696.00

TABLE 63 (continued)

System	Surface Type	Classification of Expenditures	Traffic Volume Groups: 0 - 9	10 - 24	25 - 49	50 - 99	100 - 199	200 - 299	300 - 399	400 - 499	Totals & Averages
National Forest Development System	Unimproved		1663.4 Miles	360.2 Miles	102.2 Miles	9.4 Miles					2135.2 Miles
		Annual Ave. Cost Per Mile	21.60	33.60	45.60	55.60					$ 24.92
		Total Expenditure	$35,929.00	$12,103.00	$ 4,660.00	$523.00					$53,215.00
	Primitive		601.7 Miles	13.6 Miles	3.2 Miles						618.5 Miles
		Annual Ave. Cost Per Mile	10.48	18.51	25.51						$ 10.74
		Total Expenditure	$6,306.00	$252.00	$82.00						$ 6,640.00
	Composite		2316.3 Miles	402.0 Miles	118.2 Miles	23.1 Miles	4.0 Miles	0.2 Miles	0.2 Miles	0.1 Miles	2864.1 Miles
		Annual Ave. Cost Per Mile	21.11	41.05	57.50	128.92	196.47	225.47	252.47	279.47	$ 26.57
		Total Expenditure	$48,908.00	$16,503.00	$6,796.00	$2,978.00	$ 794.00	$ 45.00	$ 50.00	$ 26.00	$76,102.00
National Indian Reservation Roads	Plain Macadam Surfacing			16.4 Miles	11.8 Miles	3.2 Miles	21.5 Miles	2.3 Miles			55.2 Miles
		Annual Ave. Cost Per Mile		208.00	263.00	327.00	365.00	403.00			$ 295.92
		Total Expenditure		$3,411.00	$3,103.00	$1,046.00	$7,848.00	$927.00			$16,335.00
	Plain Gravel Surfacing		49.1 Miles	59.6 Miles	37.0 Miles	42.4 Miles	12.7 Miles				200.8 Miles
		Annual Ave. Cost Per Mile	177.30	207.30	247.30	305.30	360.30				$ 237.70
		Total Expenditure	$8,705.00	$12,355.00	$9,150.00	$12,945.00	$4,576.00				$47,731.00
	Graded & Drained		11.6 Miles	29.8 Miles	19.1 Miles	15.7 Miles					76.2 Miles
		Annual Ave. Cost Per Mile	160.00	200.00	230.00	242.00					$ 210.08
		Total Expenditure	$1,856.00	$5,960.00	$4,393.00	$3,799.00					$16,008.00
	Unimproved		164.8 Miles	71.0 Miles	70.7 Miles	26.1 Miles	17.8 Miles	0.2 Miles	0.1 Miles		350.7 Miles
		Annual Ave. Cost Per Mile	41.60	51.60	67.60	84.60	92.60	100.00	107.40		$ 54.71
		Total Expenditure	$6,856.00	$3,664.00	$4,779.00	$2,208.00	$ 1,648.00	$ 20.00	$ 11.00		$19,186.00
	Primitive		48.1 Miles	6.9 Miles	6.3 Miles	2.9 Miles	1.0 Miles				65.2 Miles
		Annual Ave. Cost Per Mile	18.12	34.14	40.14	45.14	48.14				$ 23.62
		Total Expenditure	$872.00	$236.00	$253.00	$131.00	$ 48.00				$ 1,540.00
	Composite		273.6 Miles	183.7 Miles	114.9 Miles	90.3 Miles	53.0 Miles	2.5 Miles	0.1 Miles		718.1 Miles
		Annual Ave. Cost Per Mile	66.85	139.50	149.60	222.91	266.41	378.80	107.40		$ 134.74
		Total Expenditure	$18,289.00	$25,626.00	$21,678.00	$20,129.00	$14,120.00	$947.00	$ 11.00		$100,800.00
National Parks Highways	Plain Macadam Surfacing			0.5 Miles	0.7 Miles	1.3 Miles	2.5 Miles	2.2 Miles			7.2 Miles
		Annual Ave. Cost Per Mile		208.00	263.00	327.00	365.00	403.00			$ 349.03
		Total Expenditure		$104.00	$184.00	$425.00	$ 913.00	$887.00			$ 2,513.00
	Unimproved		2.0 Miles								2.0 Miles
		Annual Ave. Cost Per Mile	41.60								$ 41.60
		Total Expenditure	$83.00								$ 83.00
	Composite		2.0 Miles	0.5 Miles	0.7 Miles	1.3 Miles	2.5 Miles	2.2 Miles			9.2 Miles
		Annual Ave. Cost Per Mile	41.60	208.00	263.00	327.00	365.00	403.00			$ 282.17
		Total Expenditure	$83.00	$104.00	$ 184.00	$425.00	$913.00	$887.00			$ 2,596.00
National Military Reservation Roads	Unimproved		0.2 Miles								0.2 Miles
		Annual Ave. Cost Per Mile	21.60								$ 21.60
		Total Expenditure	$ 4.00								$ 4.00

With respect to these sections which have been improved to standards compatible with the "Standard Specifications for Road and Bridge Construction", it is estimated that expenditures necessary in construction and maintenance would approximate those costs set forth hereinbefore as they relate to the Federal Aid System.

The extent of these standard sections included in the Land Service System is as follows:

National Parks Highways,	High Type Bituminous Paving,	3.1 miles
	Low Type Bituminous Surfacing,	99.1 miles
National Military Reservation Roads,	Low Type Bituminous Surfacing,	1.4 miles

CHAPTER IX

APPLICATION OF DATA CONCERNING STANDARDS, RESULTS OF ROAD LIFE STUDIES, AND DISCUSSION OF UNIT COSTS TO DETERMINE AND ACCUMULATE ANNUAL COSTS IN 1950.

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IX

APPLICATION OF DATA CONCERNING STANDARDS, RESULTS OF ROAD LIFE STUDIES, AND DISCUSSION OF UNIT COSTS TO DETERMINE AND ACCUMULATE ANNUAL COSTS IN 1950.

In any effort to estimate the permanent annual cost of the road system, the data afforded in Chapters V, VI, VII and VIII may well be used. Annual costs as developed in Chapter VIII comprehend construction and reconstruction (betterment) costs, plus administrative expense amortized over a period of thirty years, plus maintenance and service charges accruing annually throughout the years selected as a basis for estimate, namely 1931 through 1936. This discussion will accept the averages set forth in Chapter VIII as indicative of probable costs in the future. It is possible that unit construction costs will decrease, on the other hand, it is probable that refinement in standards will actuate an increase in quantities to offset the decrease in unit costs with a resultant stabilization or approximate stabilization of construction costs per mile at or near those costs set forth in Chapter VIII. As regards maintenance, the data are so relatively extensive that we may state with some certainty that general maintenance costs are decreasing and that traffic service charges are increasing with a probable composite increase in combined expenditure by the Maintenance Division. These observable facts, particularly those relating to maintenance costs proper result as a circumstance of the use of higher construction standards; it is obvious that modern methods of subgrade stabilization would tend to decrease maintenance expenditures on shoulders and ditches, for example, and further given a good foundation, a bitumenized surface should not require patching to any great degree. In other words, the modern highway program comprehends "building maintenance" into the roadway structure.

As regards the statement made previously herein to the effect that the construction costs shall extend over an amortization period of thirty years, we find the supposition at odds with conclusions developed in Chapter VII, Road Life Studies, wherein, for example, we estimate the life of a high type bituminous surface (under ideal conditions) to extend through a period of twenty-five years at the most. The amortization period of thirty years is set forth in this discussion in conformity with contemporary industrial finance procedure; the period represents a time interval encompassing the life of one generation, it represents a limiting time interval for which we may project curves estimating population growth, structural deterioration and supply and demand with some degree of exactitude; in short, the interval represents a time period beyond which any estimates concerning forecasts of values would be surmise alone. The fact remains, however, that an amortization period of thirty years is commonly accepted for research in highway economics and so it will be used in this discussion. By so limiting the amortization period to thirty years it is not the intent of this discussion to say that roads, as improved by the department will last that long. Many of the components of a finished roadway may be expected to survive for a longer period, others will survive for a shorter period. It is the opinion of most authorities that we may expect a road to survive over a period of twenty to thirty years.

Chapters V and VI set forth standards and current comparisons of the systems on the basis of those standards as they now exist. The tentative standards being based on the traffic density relationships principally, it is entirely reasonable to presuppose, a "wider" system in 1950 as a consequence of increased traffic volumes forecast in Chapter IV. If next we visualize a condition wherein the rural Federal Aid System is brought up to standards commensurate with estimated traffic volumes in 1950, in one operation, the construction and reconstruction therefor being amortized over a period of thirty years to which cost we add an estimated annual maintenance and service cost we may then arrive at an estimated permanent annual cost of the road system. Further details concerning the permanent annual charge for each of the several systems follow hereafter. As set forth in Chapter V, Section 5.06, the cost data will apply to systems having a high type bituminous surface throughout.

9.01--The Rural Federal Aid System

A. Construction and Reconstruction

Federal Aid is extended the state of Montana in the amount of 56% of all construction and reconstruction items excepting those costs which accumulate as a consequence of Right-of-way purchases and administration. This has the effect of decreasing the amount of participating funds to approximately 53% of the total cost of construction and reconstruction. On the other hand, some few sections of the Federal Aid System (9.025%) traverse areas of the National Forests and the National Indian Reservations and the Federal Government bears the total cost of construction and reconstruction along these intervals with the ultimate effect of increasing the amount of participating funds for the Federal Aid System at large to approximately 57% of the whole. On the assumption that these relationships will be maintained in 1950, the table which follows presents an estimate of annual construction and reconstruction costs of a system 5719.0 miles in length built to tentative standards compatible with forecasted traffic volumes as of that time.

TABLE 64A
ESTIMATED ANNUAL CONSTRUCTION AND RECONSTRUCTION COSTS PER MILE OF THE FEDERAL AID SYSTEM, BUILT TO STANDARDS COMPATIBLE WITH FORECASTED TRAFFIC VOLUMES AS OF 1950.

Existing Surface Type	Length	Existing Surface Width	Surface Widened to -						Regrading Costs	Surfacing Costs	Initial Construction Costs	Total Reconstruction & Construction	Regular Allocation		Effective Allocation	
			18'	20'	22'	24'	27'	30'					Federal Funds	State Funds	Federal Funds	State Funds
	389.3	Variant	389.3								630	638	333	305	361	277
	317.9	"		317.9							689	689	360	329	390	299
	30.2	"			30.2						777	777	406	371	439	338
	1.2	"				1.2					865	865	452	413	489	376
Unimproved	738.6	"									666	666	348	318	377	289
	158.0	Variant	158.0								638	638	333	305	361	277
	129.0	"		129.0							689	689	360	329	390	299
Possible	12.2	"			12.2						777	777	406	371	439	338
Addition to	0.8	"				0.8					865	865	452	413	489	376
System	300.0	"									666	666	348	318	377	289
	12.1	Under 16	12.1						275	323		598	317	281	341	257
	9.1	" "		9.1					316	352		668	354	314	381	287
	0.3	" "			0.3				356	399		755	400	355	430	325
	21.5	" "							293	336		629	334	295	359	270
	2.3	16 - 17	2.3						252	323		575	305	270	328	247
	3.4	16 - 17		3.4					275	352		627	332	295	357	270
	2.9	16 - 17			2.9				316	399		715	379	336	408	307
	8.6	16 - 17							283	360		643	341	302	367	276
	1.9	22 - 23	1.9						226	323		549	291	258	313	236
	2.9	22 - 23		2.9					248	352		600	318	282	342	258
	2.7	22 - 23			2.7				289	399		688	365	323	392	296
	7.5	22 - 23							257	362		619	328	291	353	266
	14.4	24 - 25	14.4						217	323		540	286	254	308	232
	7.5	24 - 25		7.5					239	352		591	313	278	337	254
	5.3	24 - 25			5.3				280	399		679	360	319	387	292
	27.2	24 - 25							235	346		581	308	273	331	250
	24.4	26 - 27	24.4						208	323		531	281	250	303	228
	40.1	26 - 27		40.1					231	352		583	309	274	332	251
	1.2	26 - 27			1.2				272	399		671	356	315	382	289
	65.7	26 - 27							223	342		565	299	266	322	243
	14.6	28 & Over	14.6						200	323		523	277	246	298	225
	47.0	" " "		47.0					222	352		574	304	270	327	247
Graded &	0.5	" " "			0.5				263	399		662	351	311	377	285
Drained	62.1	" " "							217	346		563	298	265	321	241

TABLE 44A

ESTIMATED ANNUAL CONSTRUCTION AND RECONSTRUCTION COSTS PER MILE OF THE FEDERAL AID SYSTEM, BUILT TO STANDARDS COMPATIBLE WITH FORECASTED TRAFFIC VOLUMES AS OF 1950.

Existing Surface Type	Length	Existing Surface Width	Surface Widened to - 18'	20'	22'	24'	27'	30'	Regrading Costs	Surfacing Costs	Initial Construction Costs	Total Reconstruction & Construction	Regular Allocation Federal Funds	Regular Allocation State Funds	Effective Allocation Federal Funds	Effective Allocation State Funds
	2.8	Under 16	2.8						279	323		599	317	281	341	257
	66.2	" "		66.2					316	352		668	354	314	331	267
	116.7	" "			116.7				356	399		755	400	355	430	325
	67.4	" "				67.4			379	446		825	437	388	470	355
	253.1	" "							351	398		749	397	352	427	322
	59.2	16 - 17		59.2					275	352		627	332	295	357	270
	64.6	" "			64.6				316	399		715	379	336	430	307
	92.9	" "				92.9			356	446		802	425	377	457	345
	216.7	" "							322	406		728	386	342	415	313
	21.8	18 - 19		21.8					266	352		618	328	290	352	266
	470.1	" "			470.1				307	399		706	374	332	402	304
	1355.4	" "				1355.4			347	446		793	420	373	452	341
	134.0	" "					134.0		370	475		845	446	397	482	363
	8.7	" "						8.7	392	504		896	475	421	511	385
	1990.0	" "							338	436		774	410	364	441	333
	43.0	20 - 21		43.0					257	352		609	323	286	347	262
	175.0	" "			175.0				298	399		697	369	328	397	300
	675.9	" "				675.9			339	446		785	416	369	447	338
	158.4	" "					158.4		361	475		836	443	393	477	359
	2.4	" "						2.4	383	504		887	470	417	506	381
	1054.7	" "							332	439		771	409	362	439	332
	1.3	22 - 23	1.3						226	323		549	291	258	313	236
	81.2	" "		81.2					246	352		600	318	282	342	258
	48.7	" "			48.7				289	399		688	365	323	392	296
	454.0	" "				454.0			330	446		776	411	365	442	334
	110.4	" "					110.4		352	475		827	438	389	471	356
	21.8	" "						21.8	374	504		878	465	413	500	378
	717.4	" "							322	438		760	403	357	433	327
	8.3	24 - 25	8.3						217	323		540	286	254	308	232
	31.5	" "		31.5					239	352		591	313	278	337	255
	46.1	" "			46.1				280	399		679	360	319	387	292
	61.2	" "				61.2			321	446		767	407	360	437	330
	26.9	" "					26.9		343	475		818	434	384	466	352
	0.8	" "						0.8	365	504		869	461	408	495	374
	174.8	" "							294	416		710	376	334	405	305
	8.6	26 - 27	8.6						208	323		531	281	250	303	228
	17.2	" "		17.2					231	352		583	309	274	332	251
	20.4	" "			20.4				272	399		671	356	315	382	289
	31.4	" "				31.4			312	446		758	402	356	432	326
	0.9	" "					0.9		335	475		810	429	381	462	348
	78.5	" "							273	400		673	357	316	384	289
Surfaced or Paved	0.4	28 & Over			0.4				263	399		662	351	311	377	285
	2.2	" " "				2.2			303	446		749	397	352	427	322
	2.6	" " "							297	439		736	390	346	420	316
	638.0	Variant	638.0						32	46	547	625	331	294	356	269
	877.0	"		877.0					127	173	351	651	345	306	371	280
	997.3	"			997.3				281	382	33	696	369	327	397	299
	2742.4	"				2742.4			342	446	1	769	418	371	450	339
	430.6	"					430.6		360	475		835	443	392	476	359
All Mileage	33.7	"						33.7	379	504		863	468	415	503	380
	5719.0	"							265	351	121	737	391	346	420	317

These data point to the following significant facts:

1. The largest mileage group when improved to standards commensurate with forecasted traffic volumes will be surfaced to a twenty-four foot width, this in seeming accord with practice at the present.

2. There will be approximately 8% of the total mileage requiring widths in excess of twenty-four feet.

3. Reconstruction costs will comprise approximately 84% of the total cost of construction and reconstruction in the future assuming 5,719 miles to be the limit of the rural Federal Aid System mileage.

4. Funds originating in Montana to continue the program will amount to 43% say $1,813,000 annually.

5. Funds originating with the Federal Government will amount to 57% (participating funds plus cost of construction and reconstruction through Federal Lands) say $2,402,000.

6. The total estimated revenue necessary to continue the program on the Federal Aid System will approximate $4,215,000 annually.

B. Maintenance Costs and Service Charges

Projecting the tendencies manifest in the tabulated estimate of maintenance expenditures in Chapter VIII with due consideration being given for a decrease in direct expenditures for general maintenance and an increase in service charges, we have estimated values as of 1950 as follows:

TABLE 64B
ESTIMATED MAINTENANCE EXPENDITURES ON THE FEDERAL AID SYSTEM AS OF 1950

Mileage	Improved as of 1950 to Width of -						Estimated Cost Per Mile	Allocation of Funds 1/	
	18'	20'	22'	24'	27'	30'		Federal Funds	State Funds
	Miles	Miles	Miles	Miles	Miles	Miles			
638.0	638.0						349	3	346
877.0		877.0					377	3	374
997.3			997.3				406	3	403
2742.4				2742.4			434	3	431
430.6					430.6		477	4	473
33.7						33.7	520	4	516
5719.0							415	3	412

1/ The Public Roads Administration maintains all projects constructed on the Federal Aid System which pass through National Forest Lands for a period of two years following completion. Since this mileage comprises but 9.025% of the whole, the Federal participation in maintenance expenditure amounts to a very small sum.

C. Total Permanent Annual Cost of the Federal Aid System as of 1950.

The combination of the total construction, reconstruction and maintenance costs as tabulated herebefore presents information as follows concerning the estimated permanent annual cost of the Federal Aid System when brought to standards compatible with traffic volumes as forecast for 1950.

TABLE 64C
ESTIMATED PERMANENT ANNUAL COST OF THE FEDERAL AID SYSTEM AS OF 1950.

Mileage	Improved as of 1950 to Width of -						Annual Cost Data		Federal Funds		State Funds	
	18' Miles	20' Miles	22' Miles	24' Miles	27' Miles	30' Miles	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year
638.0	638.0						974	621,412	359	229,042	615	392,370
877.0		877.0					1,028	901,556	374	327,998	654	573,558
997.3			997.3				1,102	1,099,025	400	398,920	702	700,105
2742.4				2742.4			1,223	3,353,955	453	1,242,307	770	2,111,648
430.6					430.6		1,312	564,947	480	206,688	832	358,259
33.7						33.7	1,403	47,281	507	17,086	896	30,195
5719.0							1,152	6,588,176	424	2,422,041	728	4,166,135

In summary effect the Federal participation amounts to 36.7% of the total cost of the Federal Aid System. State revenues necessary to construct and maintain a system such as that comprehended for 1950 amount to $4,166,000 annually.

It is to be noted that the estimates given heretofore are based in many cases on generalities and are not to be taken literally for individual projects. The estimate data apply in whole to the Federal Aid System as an entity. As an example, a practical construction program would not contemplate building to a strict traffic density relationship control whereby there would be varying widths within the length of one contract. Under these conditions the tendency would be to build throughout the length of the project to accommodate the greatest volume of traffic on the road as a whole to bring about a system of ultimate higher standard than that contemplated in this discussion.

9.02 The Feeder or Secondary System

A potential feeder or secondary system is now set forth in this Chapter to extend up to a limit of say 6700 miles. It is presumed in this discussion that the Federal government will participate in the cost of the construction of such a system in the amount of 56%. The effective participation will be somewhat less than this figure for the reasons given herebefore; namely, the Federal government does not participate in the cost of right-of-way and administration. It is not probable that the secondary system will traverse Federal lands in such a large measure as does the Federal Aid System. In effect it is estimated that Federal participation in the construction cost of the secondary system will not exceed 54%.

Estimated costs of a system 6700 miles in extent are as follows:

TABLE 65A

ESTIMATED ANNUAL CONSTRUCTION AND RECONSTRUCTION COSTS PER MILE OF THE STATE SECONDARY OR FEEDER SYSTEM, BUILT TO STANDARDS COMPATIBLE WITH FORECASTED TRAFFIC VOLUMES AS OF 1950.

Existing Surface Type	Length	Existing Surface Width	Surface Width Widened to -						Regrading Costs	Surfacing Costs	Initial Construction Costs	Construction & Reconstruction Costs	Regular Allocation		Effective Allocation	
			18'	20'	22'	24'	27'	30'					Federal Funds	State Funds	Federal Funds	State Funds
	1204.6	Variant	1204.6								638	638	333	305	347	291
	1021.2	"		1021.2							689	689	360	329	375	314
	428.7	"			428.7						777	777	406	371	423	354
	66.1	"				66.1					865	865	452	413	471	394
Unimproved	2723.6	"									695	695	364	327	372	313
	1511.4	Variant	1511.4								638	638	333	305	333	305
	1286.0	"		1286.0							689	689	360	329	360	329
Possible	537.9	"			537.9						777	777	406	371	406	371
Additions	82.9	"				82.9					865	865	452	413	452	413
to System	3417.2	"									695	695	364	327	364	327
	4.7	Under 16	4.7						275	323		598	322	276	345	253
	8.4	" "		8.4					316	352		668	357	311	395	273
	8.7	" "			8.7				316	399		715	405	350	446	309
	1.1	" "				1.1			379	446		825	461	364	467	338
	23.9	" "							326	368		694	372	322	411	283
	19.1	16 - 17	19.1						252	323		575	309	266	341	234
	55.0	" "		55.0					295	352		647	338	292	371	256
	32.9	" "			32.9				316	399		715	403	332	423	292
	107.0	" "							264	361		625	345	280	362	263
	0.2	18 - 19	0.2						243	323		566	309	261	330	230
	6.1	" "		6.1					266	352		618	331	287	365	253
	22.9	" "			22.9				307	399		706	378	328	417	289
	55.9	" "				55.9			347	446		793	423	370	460	325
	4.5	" "					4.5		370	475		845	451	394	499	346
	69.6	" "							332	429		761	406	355	449	312
	0.4	20 - 21	0.4						235	323		558	300	258	331	227
	15.6	" "		15.6					257	352		609	337	292	372	257
	37.0	" "			37.0				295	399		694	374	323	412	285
	17.7	" "				17.7			339	446		785	419	366	463	322
	14.1	" "					14.1		361	475		836	446	390	493	343
	1.6	" "						1.6	383	504		887	474	413	523	364
	56.4	" "							312	414		726	390	336	430	296
	4.2	22 - 23	4.2						248	352		600	321	279	355	245
	20.9	" "			20.9				289	399		688	369	319	407	281
	39.9	" "				39.9			330	446		776	414	362	458	318
	12.9	" "					12.9		352	475		827	442	385	488	339
	77.9	" "							318	433		751	402	349	444	307
	0.1	24 - 25	0.1						217	323		540	291	249	320	220
	34.1	" "		34.1					239	352		591	316	275	349	242
	85.2	" "			85.2				280	399		679	364	315	401	278
	29.5	" "				29.5			321	446		767	410	357	453	314
	9.0	" "					9.0		343	475		818	437	381	483	335
	1.5	" "						1.5	365	504		869	464	405	513	356
	159.4	" "							283	403		686	367	319	405	281
	0.2	26 - 27	0.2						208	323		531	286	245	315	216
	5.8	" "		5.8					231	352		583	312	271	345	238
	7.3	" "			7.3				272	399		671	360	311	397	274
	0.6	" "				0.6			312	446		758	405	353	447	311
	0.1	" "					0.1		335	475		810	433	377	478	332
	14.0	" "							256	381		637	342	295	377	260
Surfaced	1.9	28 & Over				1.9			303	446		749	400	349	442	307
or Paved	0.1	" " "					0.1		326	475		801	428	373	473	328
	2.0	" " "							304	447		751	401	350	444	307
	2740.7	Variant	2740.7						2	3	632	637	333	304	339	298
	2438.4	"		2438.4					14	19	653	686	359	328	347	319
	1181.5	"			1181.5				52	73	636	761	400	361	419	346
	295.6	"				295.6			160	221	436	817	435	392	461	356
	40.7	"					40.7		351	475		826	443	383	490	336
All	3.1	"						3.1	374	504		878	469	409	518	360
Mileage	6700.0	"							24	34	628	686	359	327	369	317

At the present time the several counties are charged with the maintenance and up-keep of those sections of the secondary or feeder system now in place. Assuming maintenance costs to be in accord with value set forth in Chapter VIII, Section 8.01, the average maintenance cost for a system built to standards commensurate with forecasted traffic volumes as of 1950 would be as shown in column 8 of the tabulation which follows hereafter. Funds for maintenance as now in effect for the several counties derive from the motor vehicle license tax and the general property tax and such maintenance does not generally comprehend traffic services such as snow removal, centerline striping, signs, etc. Should the system be maintained in such a manner as to provide year round accommodations the costs would approximate those now in effect on the Federal Aid System as shown in Column 9.

TABLE 65B
ESTIMATED MAINTENANCE EXPENDITURES ON THE STATE SECONDARY OR FEEDER SYSTEM AS OF 1950.

Mileage	Improved as of 1950 to Width of -						Cost Per Mile For General Maintenance	Cost Per Mile For General Maintenance & Traffic Service
	18'	20'	22'	24'	27'	30'		
	Miles	Miles	Miles	Miles	Miles	Miles		
2740.7	2740.7						270	349
2438.4		2438.4					292	377
1181.5			1181.5				314	406
295.6				295.6			337	434
40.7					40.7		370	477
3.1						3.1	404	520
6700.0							289	374

Combining the tabulations set forth herebefore, we have an estimated total cost of operating the secondary or feeder system as follows:

TABLE 65C
ESTIMATED PERMANENT ANNUAL COST OF THE STATE SECONDARY OR FEEDER SYSTEM AS OF 1950.

Construction, Reconstruction and Maintenance Costs With No Traffic Service

Mileage	Improved as of 1950 to Width of -						Annual Cost Data		Federal Funds		State Funds		County Funds	
	18'	20'	22'	24'	27'	30'	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year
2740.7	2740.7						$ 907	$2,485,815	$339	929,097	$298	$ 816,729	$270	$ 739,989
2438.4		2438.4					970	2,364,755	367	894,893	319	777,850	282	687,012
1181.5			1181.5				1,079	1,270,113	413	487,960	352	411,162	314	370,991
295.6				295.6			1,154	341,122	461	136,278	356	105,234	337	99,616
40.7					40.7		1,196	48,677	490	19,943	336	13,679	370	15,059
3.1						3.1	1,282	3,974	518	1,606	360	1,116	404	1,252
6700.0							$ 975	$6,534,456	$369	$2,469,771	$317	$2,125,766	$289	$1,936,919

Construction, Reconstruction and Maintenance Costs, Including Traffic Service

Mileage	Improved as of 1950 to Width of -						Annual Cost Data		Federal Funds		State Funds		County Funds	
	18'	20'	22'	24'	27'	30'	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year
2740.7	2740.7						$ 966	$2,647,330	$339	929,097	$298	$ 816,729	$349	$ 956,504
2438.4		2438.4					1,063	2,592,019	367	894,893	319	777,850	377	919,276
1181.5			1181.5				1,167	1,378,611	413	487,960	352	411,162	406	479,489
295.6				295.6			1,251	369,790	461	136,278	356	105,234	434	128,280
40.7					40.7		1,305	53,038	490	19,943	336	13,679	477	19,414
3.1						3.1	1,398	4,334	518	1,606	360	1,116	520	1,612
6700.0							$1,060	$7,100,322	$369	$2,469,771	$317	$2,125,766	$374	$2,504,765

9.03 State Highway System Comprising the Federal Aid System and the Secondary System

Presuming "ownership" of a system comprising the Federal Aid System and the Secondary System as an entity built to standards commensurate with forecast traffic volumes as of 1950, the cost of such a system would be estimated to be as follows:

This table sets forth the estimate of the cost of ownership on the premise that there will be no charges assessed for traffic service on that mileage included in the State Secondary System.

TABLE 66
ESTIMATED ANNUAL COST OF THE FEDERAL AID SYSTEM AND THE STATE SECONDARY SYSTEM COMBINED AS OF 1950

Type of Expenditure	Mileage	Improved as of 1950 to Width of -						Annual Cost Data		Federal Funds		State Funds		County Funds	
		18'	20'	22'	24'	27'	30'	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year	Per Mile	Total Per Year
For Construction And Reconstruction	3378.7	3378.7						$ 635	$ 2,144,576	$342	$1,156,225	$293	$ 988,351		
	3315.4		3315.4					677	2,243,669	368	1,220,260	309	1,023,409		
	2178.8			2178.8				731	1,593,243	406	883,886	325	709,355		
	3038.0				3038.0			792	2,405,258	451	1,370,352	341	1,034,906		
	471.3					471.3		834	393,169	477	224,909	357	168,260		
	36.8						36.8	883	32,479	504	18,557	379	13,922		
	12419.0							$ 710	$ 8,812,394	$392	$4,874,191	$318	$3,938,203		
For Maintenance	3378.7	3378.7						$ 285	$ 962,651	$ 1	$ 1,914	$ 65	$ 220,746	$219	$ 739,989
	3315.4		3315.4					314	1,042,642	1	2,631	99	327,999	214	712,012
	2178.8			2178.8				356	775,895	1	2,992	184	401,912	171	370,991
	3038.0				3038.0			425	1,289,819	3	8,227	389	1,181,976	33	99,616
	471.3					471.3		468	220,455	4	1,722	432	203,674	32	15,059
	36.8						36.8	510	18,776	4	135	473	17,309	33	1,252
	12419.0							$ 347	$ 4,310,238	$ 1	$ 17,621	$190	$2,353,698	$156	$1,938,919
All Expenditures	3378.7	3378.7						$ 920	$ 3,107,227	$343	$1,158,139	$358	$1,209,099	$219	$ 739,989
	3315.4		3315.4					991	3,286,311	369	1,222,891	408	1,351,408	214	712,012
	2178.8			2178.8				1,087	2,369,138	407	886,880	509	1,111,267	171	370,991
	3038.0				3038.0			1,217	3,695,077	454	1,378,579	730	2,216,882	33	99,616
	471.3					471.3		1,302	613,624	481	226,631	769	371,934	32	15,059
	36.8						36.8	1,393	51,255	508	18,692	852	31,311	33	1,252
	12419.0							$1,057	$13,122,632	$393	$4,891,812	$508	$6,291,901	$156	$1,938,919

We find from the tabulation that state funds necessary in such a program as that comprehended will exceed the forecast of gasoline license tax revenues for 1950 by about $300,000. It is to be noted also that Federal funds necessary to prosecute the program, if advanced in accord with present allottment procedure, will total about $4,900,000 this being approximately $1,400,000 in excess of the funds now appropriated by the Federal agencies for construction along the Federal Aid System and the State Secondary System.

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ROAD USE STUDIES

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ROAD USE STUDIES

The discussion heretofore is based primarily on data deriving from the Rural Road Inventory and the Traffic Survey. Supplementing these studies, as a means of evaluating the relative generality of system use, we have the findings of the Road Use Survey. This study based on numerous field interviews points toward certain well defined tendencies in road system use, the origin of such travel or traffic, and the incentive for such vehicle movement. The Traffic Survey is conclusive to a certain extent in that it measures all rural traffic flow, foreign and local, and to some degree the characteristic of the flow; the Road Use Study comprehends a more detailed analysis of local driving habits with a view toward assigning equity in terms of tax contributions in relation to benefits returned therefor when correlated with the Fiscal Study.

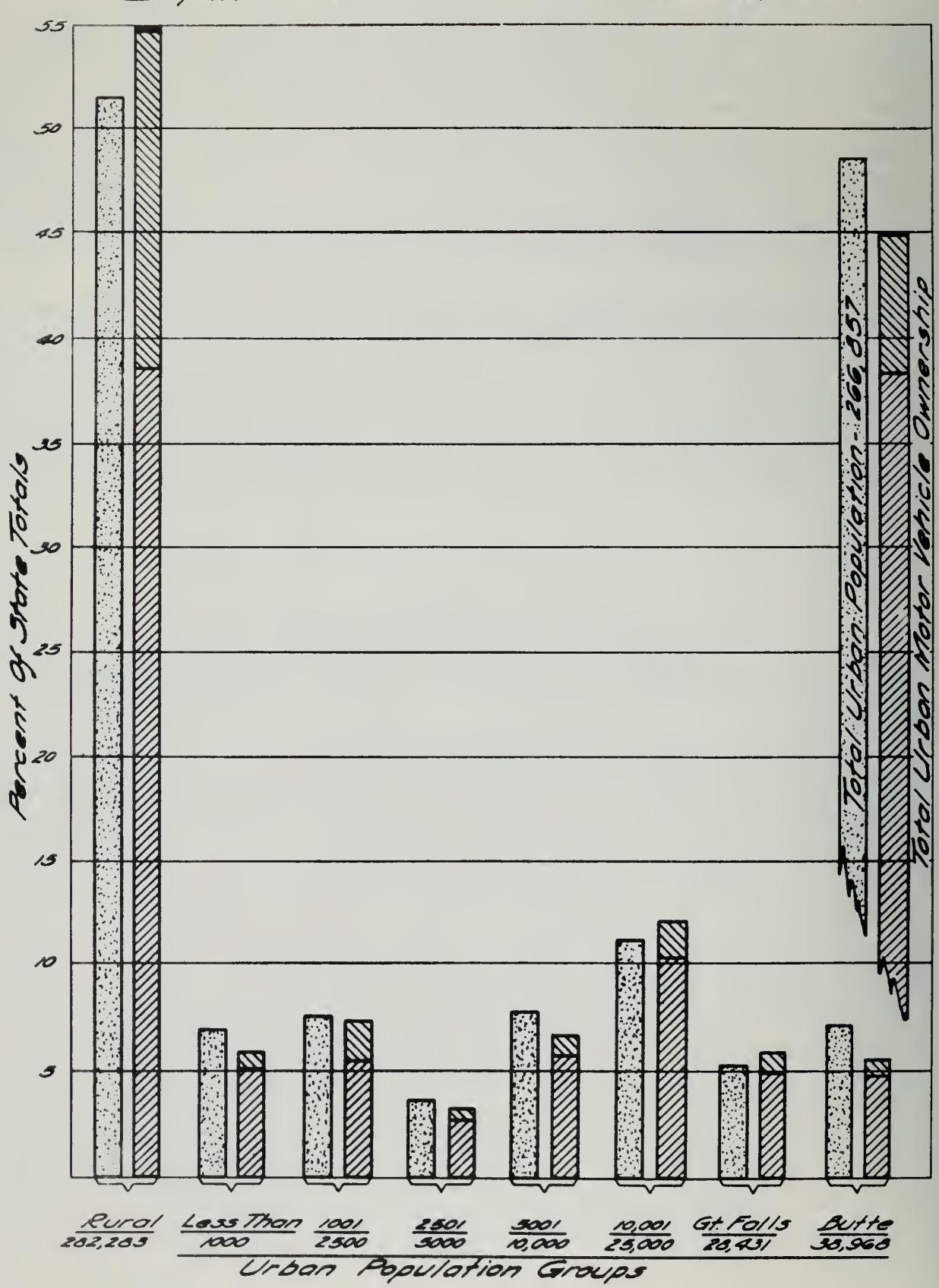
With a view toward procuring selective information, the Road Use interviews were divided between vehicle owners resident in urban areas and vehicle owners resident in rural areas, it being assumed that driving habits with respect to system usage were different in each of the categories. The data, as set forth in the detailed Road Use Survey, supports the presumption in many ways. Information was secured also concerning the use of the several systems by passenger car owners and truck and bus owners. A summary of the primary basic data discloses information as shown in Table 67 and on Plate XXVII on the following page.

TABLE 67
COMPARISON OF POPULATION AND MOTOR VEHICLE OWNERSHIP

Owned by residents of -	Total Population		Passenger Cars		Trucks		Buses		Total Registration	
	Persons	%	Number	%	Number	%	Number	%	Number	%
Unincorporated areas (Rural)	282,283	51.4	63,408	38.4	26,990	16.3	489	0.3	90,887	55.0
Incorporated areas having a population of -										
1,000 or less	37,182	6.8	8,168	4.9	1,493	0.9	27	.02	9,688	5.8
1,001 to 2,500	40,902	7.4	8,985	5.4	1,669	1.0	30	.02	10,684	6.4
2,501 to 5,000	18,509	3.4	4,217	2.5	659	0.4	12	.01	4,888	2.9
5,001 to 10,000	41,759	7.6	9,228	5.6	1,589	1.0	29	.02	10,846	6.6
10,001 to 25,000	61,106	11.1	16,797	10.2	2,797	1.7	51	.03	19,645	12.0
Great Falls	28,431	5.2	7,900	4.9	1,515	0.9	27	.02	9,442	5.8
Butte	38,968	7.1	7,957	4.7	1,244	0.8	23	.01	9,224	5.5
Total Incorporated Areas (Urban)	266,857	48.6	63,252	38.2	10,966	6.7	199	0.1	74,417	45.0
Total	549,140	100.0	126,660	76.6	37,956	23.0	688	0.4	165,304	100.0

PLATE XXVII

COMPARISON OF POPULATION AND MOTOR VEHICLE OWNERSHIP



In connection with the analysis of road system use, the basic highway systems were designated as follows:

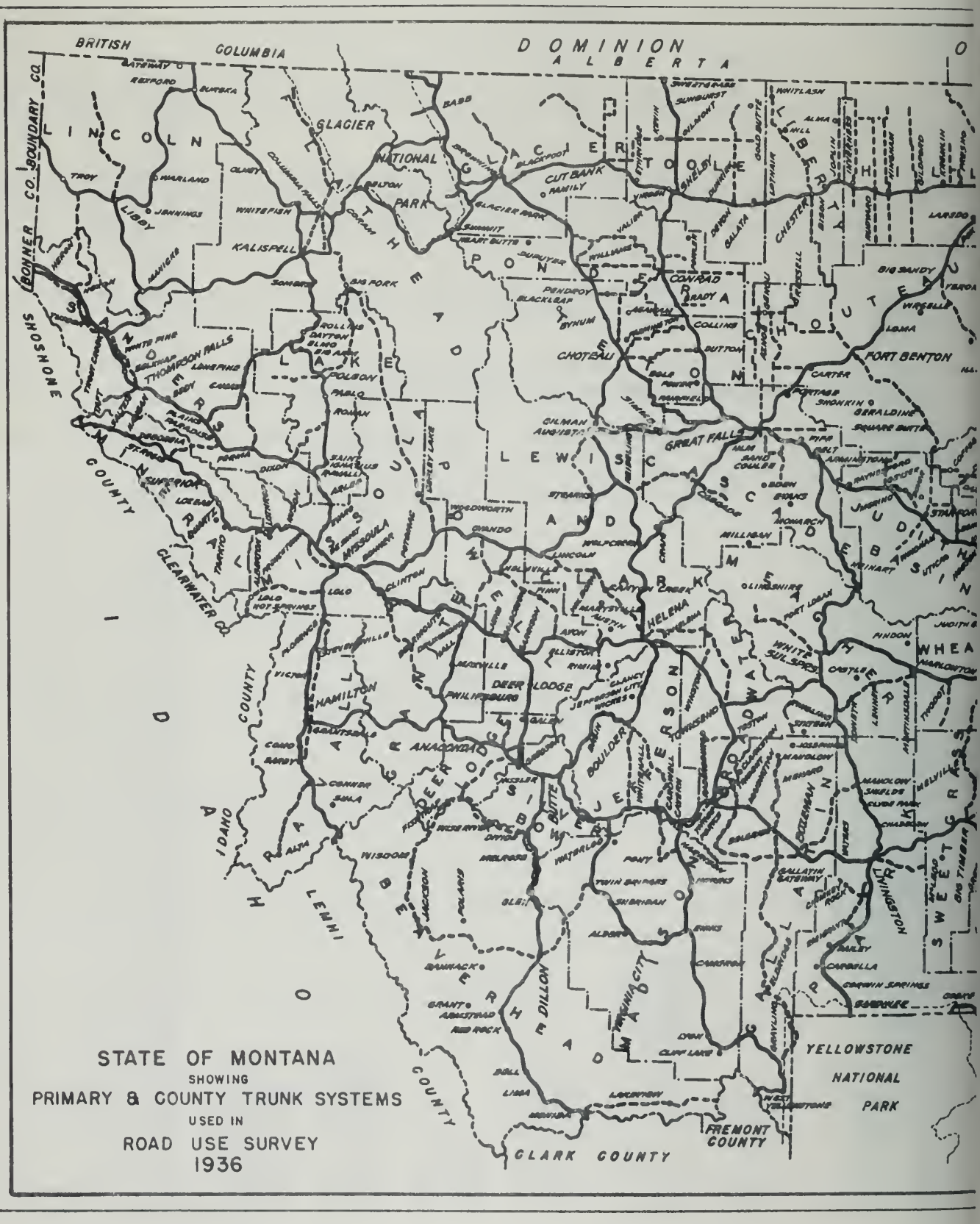
a. Primary highways including the Federal Aid System together with its extensions and continuations through urban areas. (See Chapter II, Section 2.031)

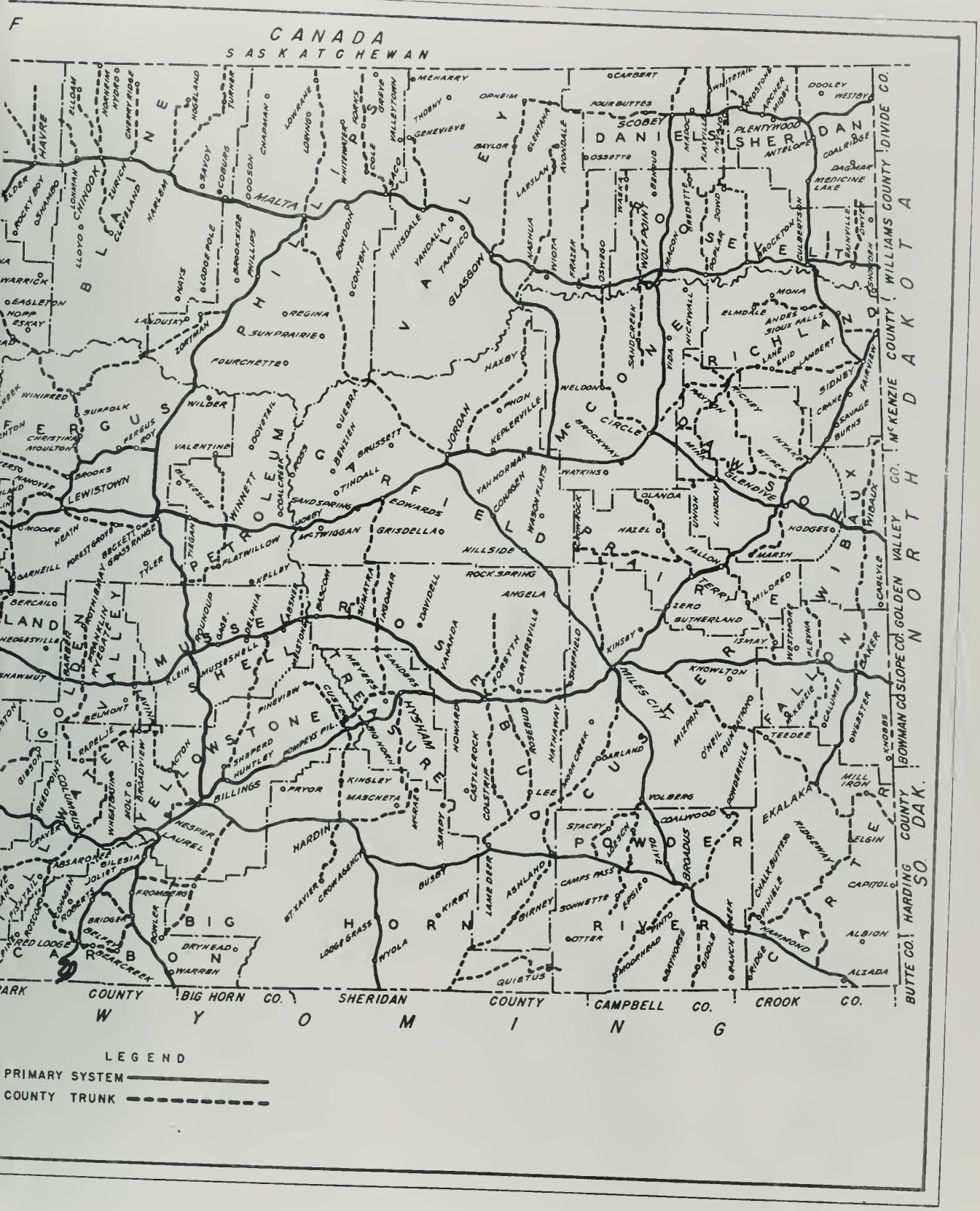
b. The County Trunk System, including nearly all sections of the County Trunk System discussed in Chapter Two, Section 2.041 plus other important county roads which serve to facilitate transport in rural areas together with their extensions through urban areas.

c. Local rural roads comprise all other public thoroughfares not included in the designations set forth hereabove.

d. City and Local streets and alleys include extensions of the rural road systems as designated above through urban areas.

The map included herewith serves to clarify the designations set forth hereabove.


BRITISH COLUMBIA
DOMINION
ALBERTA
BONNER CO.
BOUNDARY CO.
LINCOLN
GLACIER
NATIONAL
PARK
THE
PONDERA
TETON
LIBERTY
HILL
CHOUTEAU
CASCADE
JUDITH BASIN
WHEATLAND
MEAGHER
GOLDEN VALLEY
MUSSELSHELL
YELLOWSTONE
NATIONAL
PARK
SWEET GRASS
STILLWATER
CARBON
BIG HORN
SHOSHONE
SANDERS
LAKE
MISSOULA
RAVALLI
CLEARWATER CO.
IDAHO
LEMHI
BEAVERHEAD
MADISON
GALLATIN
PARK
JEFFERSON
BROADWATER
LEWIS AND CLARK
POWELL
DEER LODGE
SILVER BOW
HAMILTON
ANACONDA
DILLON
VIRGINIA CITY
LIVINGSTON
BOZEMAN
HELENA
GREAT FALLS
FORT BENTON
CUT BANK
CONRAD
SHELBY
KALISPELL
LIBBY
THOMPSON FALLS
MISSOULA
DEER LODGE
BUTTE
BOULDER
WHITE SULPHUR SPRINGS
LEWISTOWN
ROUNDUP
HARLOWTON
JUDITH GAP
LIVINGSTON
BIG TIMBER
CLARK COUNTY
FREMONT COUNTY
STATE OF MONTANA
SHOWING
PRIMARY & COUNTY TRUNK SYSTEMS
USED IN
ROAD USE SURVEY
1936


CANADA
SASKATCHEWAN
MONTANA
WYOMING
NORTH DAKOTA
HAVRE
CHINOOK
HARLEM
MALTA
GLASGOW
WOLF POINT
SCOBEY
PLENTYWOOD
CULBERTSON
SIDNEY
FAIRVIEW
WILLISTON
WILLIAMS COUNTY
DIVIDE CO.
McKENZIE COUNTY
GOLDEN VALLEY CO.
BOWMAN CO
SLOPE CO.
HARDING COUNTY
SO. DAK.
BUTTE CO.
CROOK CO.
CAMPBELL CO.
SHERIDAN COUNTY
BIG HORN CO.
PARK COUNTY
LEWISTOWN
GREAT FALLS
HAVRE
MILES CITY
BILLINGS
BIG HORN
POWDER RIVER
LEGEND
PRIMARY SYSTEM
COUNTY TRUNK

10.01 Vehicle Mileage Served by Each of the Several Systems, Primary County Trunk, Local, and City Streets

Motor vehicle traffic is distributed over each of the several road classifications in accord with the tabulation which follows and as shown on Plates XXIX and XXX.

TABLE 68
PERCENT OF TOTAL VEHICLE MILEAGE
SERVED BY EACH OF THE ROAD SYSTEMS

Owned by residents of -	Rural									Urban									Total Rural	Total Urban
	Primary System			County Trunk System			Local Roads			Primary System			County Trunk System			Local Streets				
	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/		
Unincorporated areas (Rural)	18.4	6.9	25.3	8.0	3.2	11.2	9.0	4.7	13.7	1.0	0.4	1.4	0.2	0.1	0.3	0.8	0.3	1.1	50.2	2.8
Incorporated areas having a population of -																				
1,000 or less	3.2	0.5	3.7	0.6	0.1	0.7	0.8	0.2	1.0	0.1		0.1				0.1		0.1	5.4	0.2
1,001 to 2,500	3.6	0.6	4.2	0.5	0.1	0.6	0.4	0.1	0.5	0.1		0.1				0.6	0.3	0.9	5.3	1.0
2,501 to 5,000	1.7	0.3	2.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1		0.1	0.2	0.1	0.3	2.4	0.6
5,001 to 10,000	3.7	0.8	4.5	0.5	0.1	0.6	0.4	0.1	0.5	0.2		0.2				0.9	0.2	1.1	5.6	1.3
10,001 to 25,000	6.0	1.3	7.3	0.5	0.1	0.6	0.6	0.1	0.7	0.4	0.1	0.5				2.7	0.8	3.5	6.6	4.0
Great Falls 28,431	2.7	0.4	3.1	0.2		0.2	0.1		0.1	0.1		0.1	0.1		0.1	2.6	0.5	3.1	3.4	3.3
Butte 38,968	2.9	0.3	3.2	0.2		0.2	0.6	0.2	0.8	0.1		0.1				1.2	0.4	1.6	4.2	1.7
Total urban areas	23.8	4.2	28.0	2.6	0.5	3.1	3.0	0.8	3.8	1.1	0.2	1.3	0.2		0.2	8.3	2.3	10.6	34.9	12.1
Total	42.2	11.1	53.3	10.6	3.7	14.3	12.0	5.5	17.5	2.1	0.6	2.7	0.4	0.1	0.5	9.1	2.6	11.7	85.1	14.9

1/ Passenger Cars 2/ Trucks & Buses 3/ All Vehicles

Significant data deriving from this tabulation and associated previous tables are as follow:

A. Relating to Ownership

1. The rural population, comprising 51.4% of the whole, owns 55.0% of the total motor vehicles registered. The rural population owns motor vehicles in the ratio 1:1.07.

2. Urban population in the group of towns having a population of 1,000 or less, comprising 6.8% of the total population, owns 5.8% of the total motor vehicles, the ratio of population to motor vehicle ownership being 1:0.85.

3. Those urban residents situate in towns having a population of 1,001 to 2,500, comprising 7.4% of the whole, own 6.4% of the total number of motor vehicles, the ratio of population to ownership being 1:0.85.

4. Those urban residents in towns having a population of 2,501 to 5,000 comprising 3.4% of the total population, own 2.9% of the total registered motor vehicles, the ratio of population to ownership being 1:0.85.

5. Those urban residents in cities of 5,001-10,000 population, comprising 7.6% of the whole, own 6.6% of the total motor vehicles, the ratio of population to ownership being 1:0.87.

6. Those urban residents situate in cities having a population of 10,001 to 25,000, comprising 11.1% of the total population, own 12.0% of the total number of motor vehicles, the ratio of population to ownership being 1:1.08.

7. The residents of the city of Great Falls comprising 5.2% of the total population owns 5.8% of the total registered motor vehicles, the ratio of population to ownership being 1:1.115.

8. Residents of the city of Butte, comprising 7.1% of the total population, own 5.5% of the total registered motor vehicles, the ratio of population to ownership being 1:0.775.

9. Urban residents of the state, comprising 48.6% of the total population own 45.0% of the total registered motor vehicles, the ratio of population to ownership being 1:0.93.

PLATE XXIX

PERCENT OF TOTAL VEHICLE MILEAGE SERVED BY EACH OF THE ROAD SYSTEMS

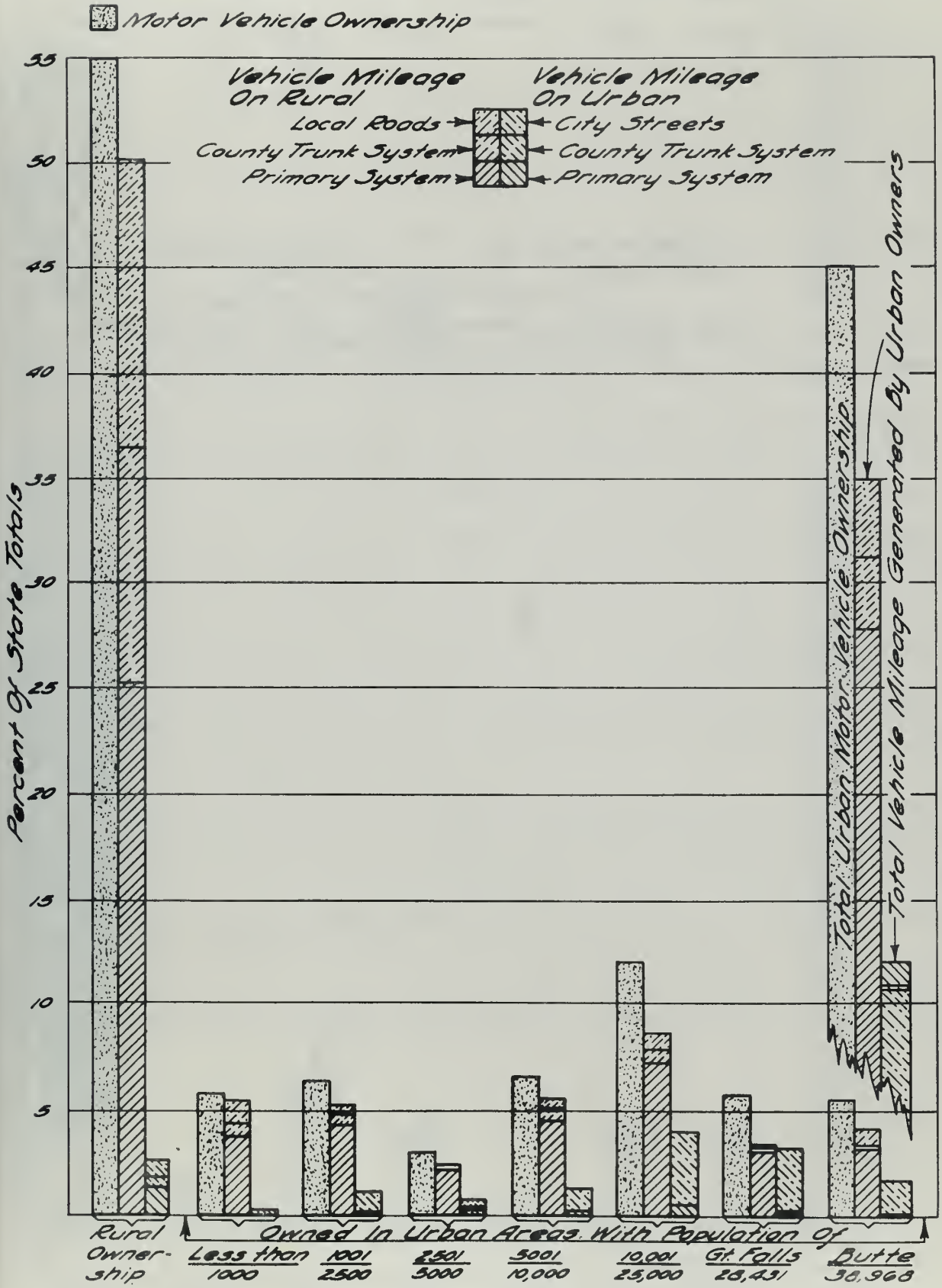
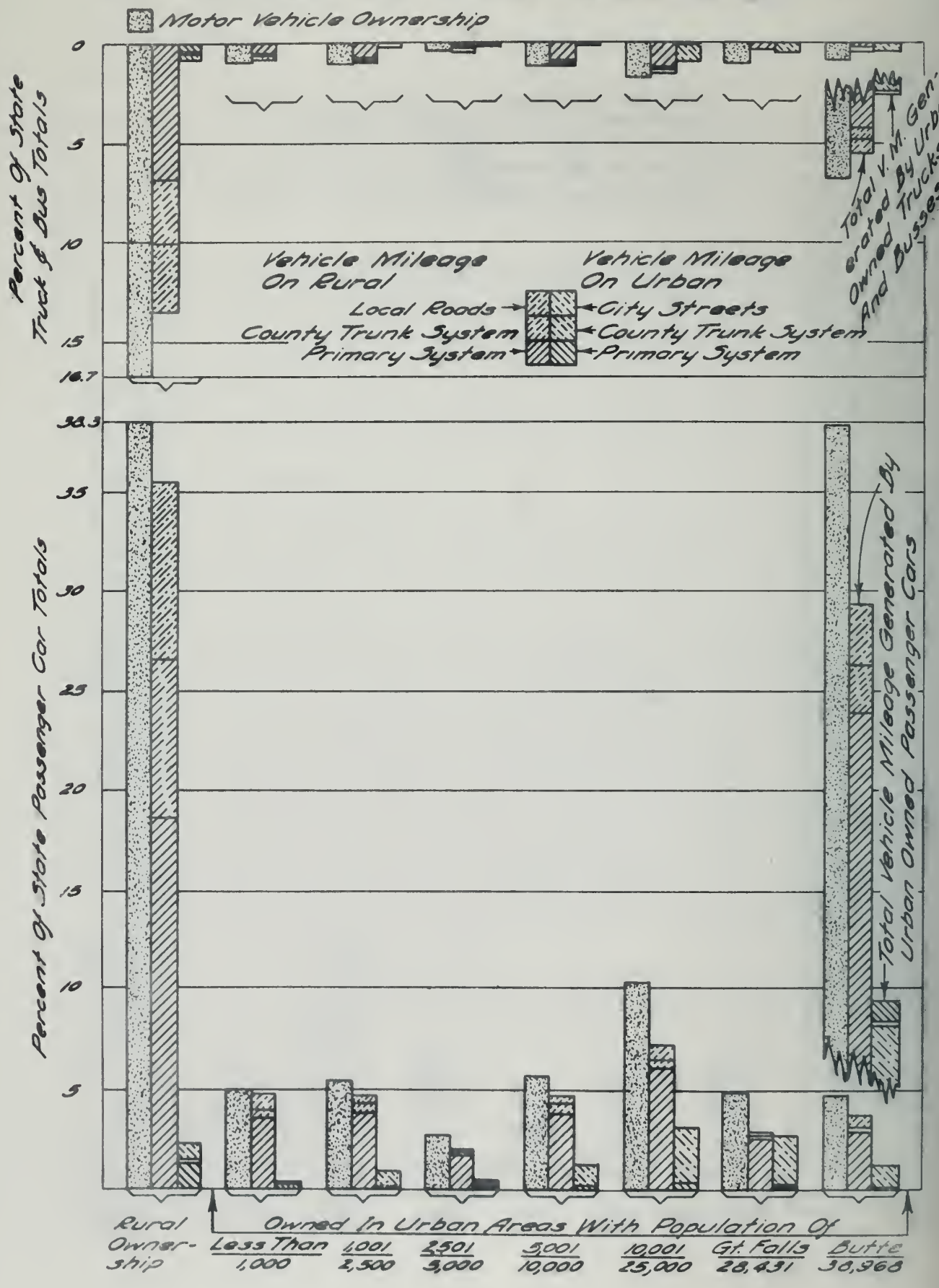


PLATE XXX

Percent Of Total Vehicle Mileage Generated By All Vehicles & Measure Of Service Therefor By Systems



B. Relating to Vehicle Mileage Generated

1. Rural residents generated 53.0% of the total vehicle mileage, the ratios population to vehicle mileage and motor vehicle ownership to vehicle mileage being 1:1.03 and 1:0.964 respectively.

2. Residents in towns of less than 1,000 generated 5.6% of all vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:0.824 and 1:0.965 respectively.

3. Residents in towns of 1,001 to 2,500 generated 6.3% of the total vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:0.852 and 1:0.985 respectively.

4. Residents in towns of 2,501 to 5,000 generated 3.0% of the total vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:0.882 and 1:0.34 respectively.

5. Residents in towns of 5,001 to 10,000 generated 6.9% of the total vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:0.908 and 1:1.045 respectively.

6. Residents in towns of 10,001 to 25,000 generated 12.6% of the total vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:1.136 and 1:1.05 respectively.

7. Residents in Great Falls generated 6.7% of the total vehicle mileage, the ratios of population and motor vehicle ownership to vehicle mileage being 1:1.29 and 1:1.155 respectively.

8. Residents in Butte generated 5.9% of the total vehicle mileage, the ratios population and motor vehicle ownership to vehicle mileage being 1:0.83 and 1:1.072 respectively.

9. Urban residents of the state generated 47.0% of the total vehicle mileage, the ratios population and motor vehicle ownership to vehicle mileage being 1:0.967 and 1:0.45 respectively.

10. The data show generally that each rural resident generates more vehicle mileage than does the urban resident: opposed to this, however, we find that each urban vehicle generates more vehicle mileage than does the rural owned vehicle.

C. Relating to Road System Use

1. Travel of rural owned vehicles was distributed among the several systems as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	25.3	47.7
	Urban	1.4	2.6
County Trunk	Rural	11.2	21.1
	Urban	0.3	0.6
Local	Rural	13.7	25.9
	Urban	1.1	2.1
All Systems	Rural	50.2	94.7
	Urban	2.8	5.3
	Total	53.0	100.0

2. Travel of vehicles owned in towns of less than 1,000 population was distributed to the several systems as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	3.7	66.1
	Urban	0.1	1.8
County Trunk	Rural	0.7	12.5
	Urban		
Local	Rural	1.0	17.8
	Urban	0.1	1.8
All Systems	Rural	5.4	96.4
	Urban	0.2	3.6
	Total	5.6	100.0

3. Travel of vehicles owned in towns of a population of 1,001 to 2,500 was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	4.2	66.7
	Urban	0.1	1.6
County Trunk	Rural	0.6	9.5
	Urban		
Local	Rural	0.5	7.9
	Urban	0.9	14.3
All Systems	Rural	5.3	84.1
	Urban	1.0	15.9
	Total	6.3	100.0

4. Travel of vehicles owned in towns having a population of 2,501 to 5,000 was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	2.0	66.7
	Urban	0.2	6.7
County Trunk	Rural	0.2	6.7
	Urban	0.1	3.3
Local	Rural	0.2	6.6
	Urban	0.3	10.0
All Systems	Rural	2.4	80.0
	Urban	0.6	20.0
	Total	3.0	100.0

5. Travel of vehicles owned in towns having a population of 5,001 to 10,000 was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	4.5	65.2
	Urban	0.2	2.9
County Trunk	Rural	0.6	8.7
	Urban		
Local	Rural	0.5	7.3
	Urban	1.1	15.9
All Systems	Rural	5.6	81.2
	Urban	1.3	18.8
	Total	6.9	100.0

6. Travel of vehicles owned in towns having a population of 10,001 to 25,000 was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	7.3	57.9
	Urban	0.5	4.0
County Trunk	Rural	0.6	4.8
	Urban		
Local	Rural	0.7	5.6
	Urban	3.5	27.7
All Systems	Rural	8.6	68.3
	Urban	4.0	31.7
	Total	12.6	100.0

7. Travel of vehicles owned in Great Falls was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	3.1	46.3
	Urban	0.1	1.5
County Trunk	Rural	0.2	3.0
	Urban	0.1	1.5
Local	Rural	0.1	1.5
	Urban	3.1	46.2
All Systems	Rural	3.4	50.8
	Urban	3.3	49.2
	Total	6.7	100.0

8. Travel of vehicles owned in Butte was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	3.2	54.2
	Urban	0.1	1.7
County Trunk	Rural	0.2	3.4
	Urban		
Local	Rural	0.8	13.6
	Urban	1.6	27.1
All Systems	Rural	4.2	71.2
	Urban	1.7	28.8
	Total	5.9	100.0

9. Travel of vehicles owned in all urban areas was distributed as follows:

Road System	Areal Classification	Percent of - Total Vehicle Mileage	Percent of - Classified Resident Vehicle Mileage
Primary	Rural	28.0	59.5
	Urban	1.3	2.8
County Trunk	Rural	3.1	6.6
	Urban	0.2	0.4
Local	Rural	3.8	8.1
	Urban	10.6	22.6
All Systems	Rural	34.9	74.2
	Urban	12.1	25.8
	Total	47.0	100.0

D. Relating to General System Usage

1. 56% of all travel was on the Primary System, of which 47.7% was furnished by rural residents and 52.3% by urban residents.

2. 14.8% of all travel was on the County Trunk System, of which 77.7% was furnished by rural residents and 22.3% by urban residents.

3. 17.5% of all travel was on rural local roads, of which 78.3% was furnished by rural residents and 21.7% by urban residents.

4. 11.7% of all travel was on local streets, of which 9.4% was furnished by rural residents and 90.6% was furnished by urban residents.

5. 85.1% of all vehicle mileage was generated on rural roads, of which 59% was furnished by rural residents and 41% by urban residents.

6. 14.9% of all travel was on urban streets, of which 18.8% was furnished by rural residents and 81.2% by urban residents.

10.02 Characteristics of Travel With Respect to Origin and Destination Types

Origin and destination studies afford a means of identifying each of the several systems on the basis of their functional use. For example it is found that the Federal Aid System provides a medium of transport for traffic having urban origins and urban destinations to the amount of 39.4% of all traffic. In other words this portion of traffic will be sustained over a considerable length of roadway as a function of inter-urban traffic. With respect to intermediate termini, this travel may be called "through" traffic. Further data concerning this inter-urban and inter-community traffic are set forth as follows:

TABLE 69
SHOWING PERCENTAGES OF TRAVEL FROM EACH TYPE OF ORIGIN (RURAL OR URBAN) TO EACH TYPE OF DESTINATION (RURAL OR URBAN)

Resident Classification	Vehicle Class'n.	Primary System					County Trunk System					Local Road System				
		Percent of Total Travel on System	Urban - Urban	Urban - Rural	Rural - Urban	Rural - Rural	Percent of Total Travel on System	Urban - Urban	Urban - Rural	Rural - Urban	Rural - Rural	Percent of Total Travel on System	Urban - Urban	Urban - Rural	Rural - Urban	Rural - Rural
Urban	Passenger Cars	44.4	78.1	10.6	11.2	0.1	18.7	25.2	37.1	37.4	0.3	17.1	35.7	29.5	33.6	1.2
	Trucks & Buses	7.9	57.8	21.1	21.1		3.6	18.7	39.7	41.6		4.6	36.7	28.2	31.6	3.5
Rural	Passenger Cars	34.7	0.4	39.4	38.6	21.6	55.3		34.2	34.2	31.6	51.5	0.1	12.7	12.6	74.6
	Trucks & Buses	13.0		35.8	35.8	28.4	22.4		27.6	26.8	45.6	26.8		16.5	16.1	67.4
All Residents	Passenger Cars	79.1	34.8	18.4	18.4	7.5	74.0	4.7	25.9	25.9	17.5	68.6	6.1	11.6	12.2	38.7
	Trucks & Buses	20.9	4.6	6.3	6.3	3.7	26.0	0.7	7.5	7.5	10.3	31.4	1.7	5.7	5.8	18.2
	Total	100.0	39.4	24.7	24.7	11.2	100.0	5.4	33.4	33.4	27.8	100.0	7.8	17.3	18.0	56.9

PLATE XXXI-A

Showing Characteristic Travel On The Federal Aid System Classified By Situs Of Ownership

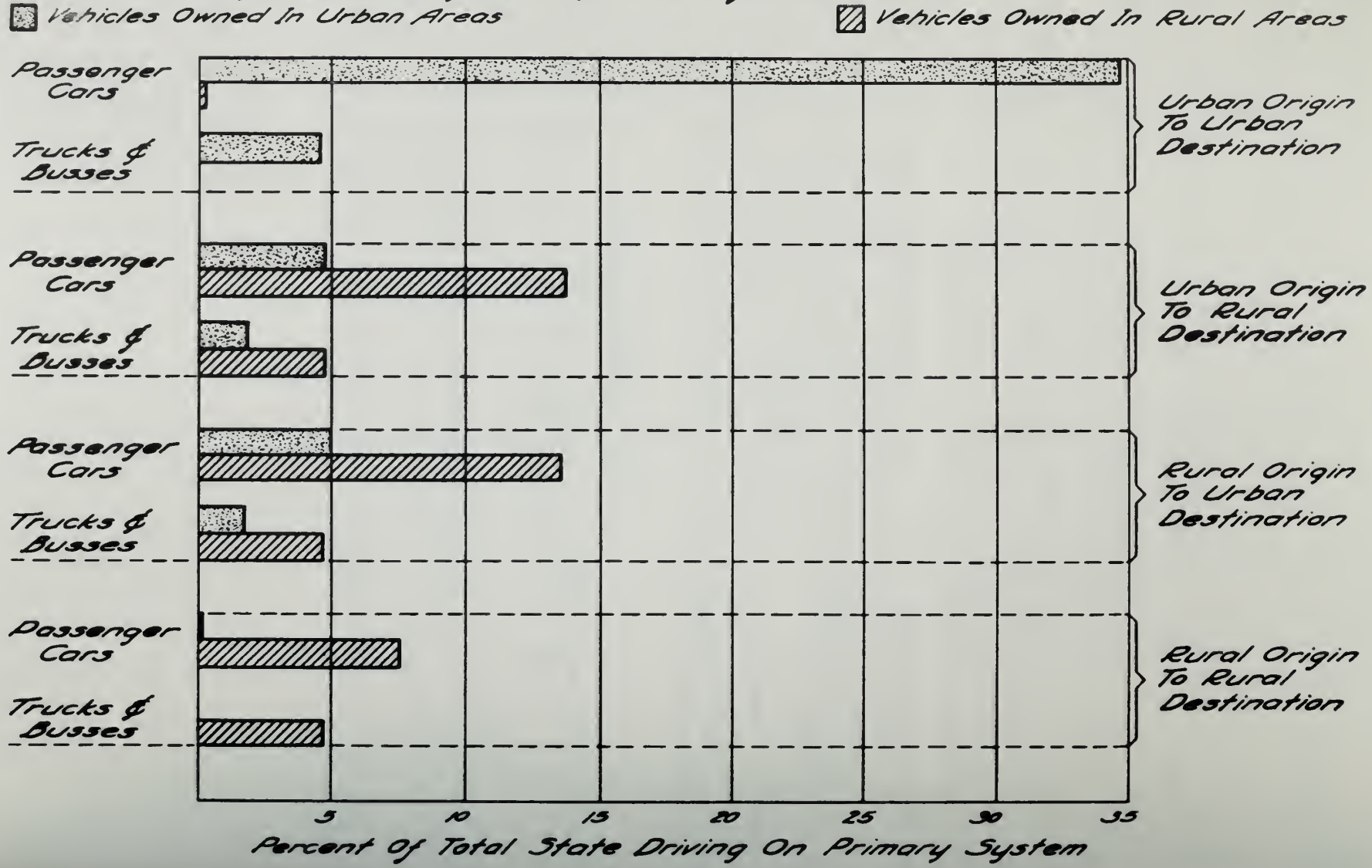


PLATE XXXI - B

Showing Characteristic Travel On The County Trunk System Classified By Situs Of Ownership

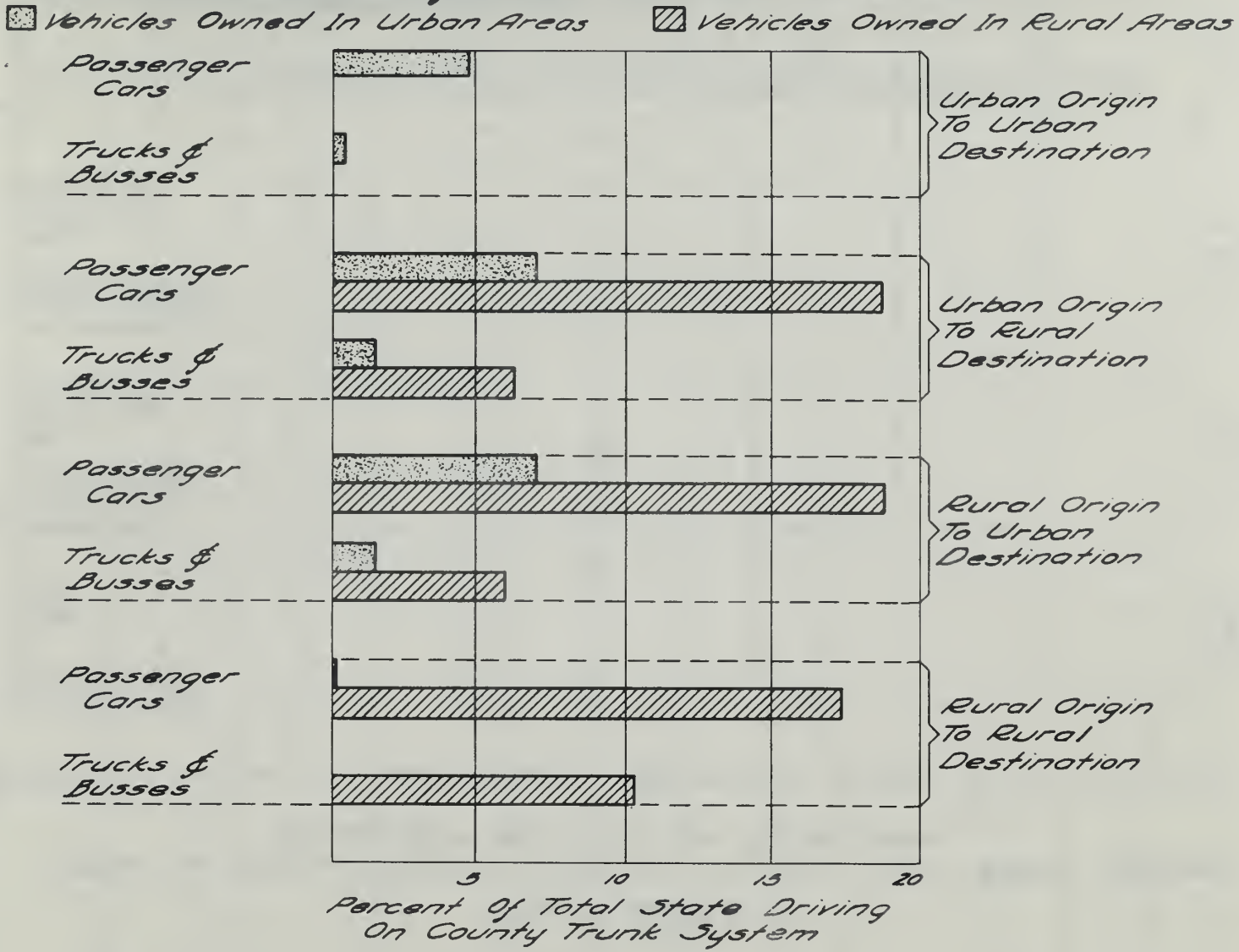
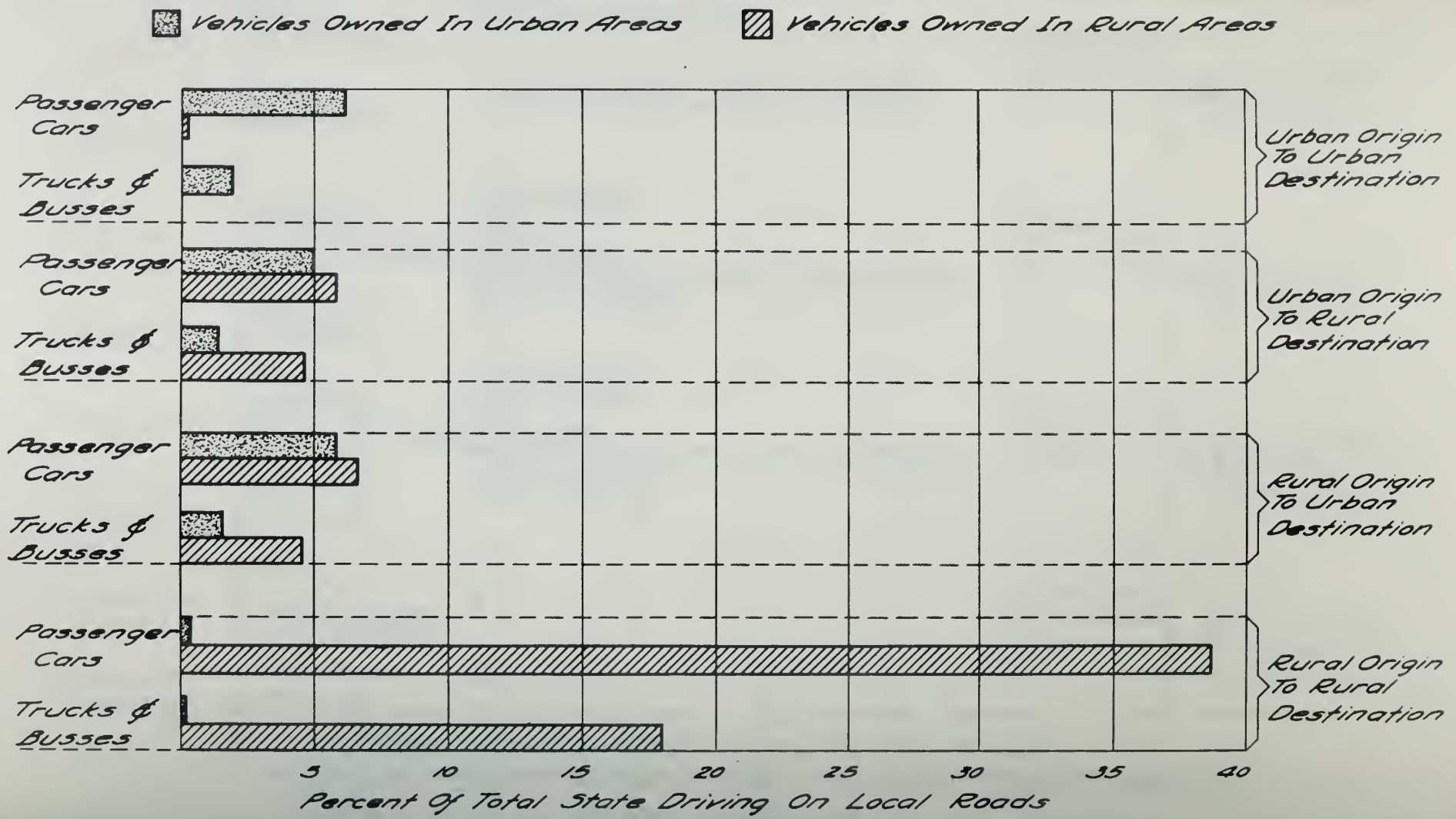


PLATE XXXI-C

Showing Characteristic Travel On The Local Road System Classified By Situs Of Ownership



Significant data deriving from the tabulation and the plates are as follows:

A. Relating to Primary System Usage

1. Traffic with urban origin and urban destination constitutes the largest classification on the Primary System.

2. Reciprocating traffic, urban to rural and rural to urban, constitutes the next largest group.

3. Traffic, rural origin to rural destination, constitutes the smallest group.

4. 83.8% of all driving in urban owned vehicles has its origin coincident with the situs of ownership.

5. 62.2% of all driving in rural owned vehicles has its origin coincident with the situs of ownership.

B. Relating to County Trunk System Usage

1. Reciprocating traffic, urban to rural and rural to urban, constitutes the largest characteristic group on the County Trunk System.

2. Inter-community driving, rural origin to rural destination constitutes the next largest characteristic group.

3. Inter-urban traffic constitutes the smallest characteristic group on the County Trunk System.

4. 60.3% of all driving in urban owned vehicles has its origin coincident with the situs of ownership.

5. 69.1% of all driving in rural owned vehicles on the County Trunk System has its origin coincident with the situs of ownership.

C. Relating to Local Road Usage

1. Inter-community driving, rural origin to rural destination, constitutes the largest characteristic group.

2. Reciprocating traffic constitutes the next largest group.

3. Inter-urban traffic constitutes the smallest characteristic group.

4. 65% of all driving in urban owned vehicles has its origin coincident with the situs of ownership.

5. 85.3% of all driving in rural owned vehicles has its origin coincident with the situs of ownership.

D. Summary of Conclusions

1. Traffic on the Primary System has origin or destination in an urban area 88.8% of the time. On the County Trunk System an origin or destination within an urban area may be presumed 72.2% of the time, while traffic on the Local Road System, has origin or destination within an urban area 43.1% of the time. As a side issue in the question of identifying "through" or primary traffic, we might say that such traffic as is generated by local owners must intend origin or destination within an urban area about 90% of the time to fall in the classification.

10.03 **Characteristics of Travel With Respect to State and County Lines**

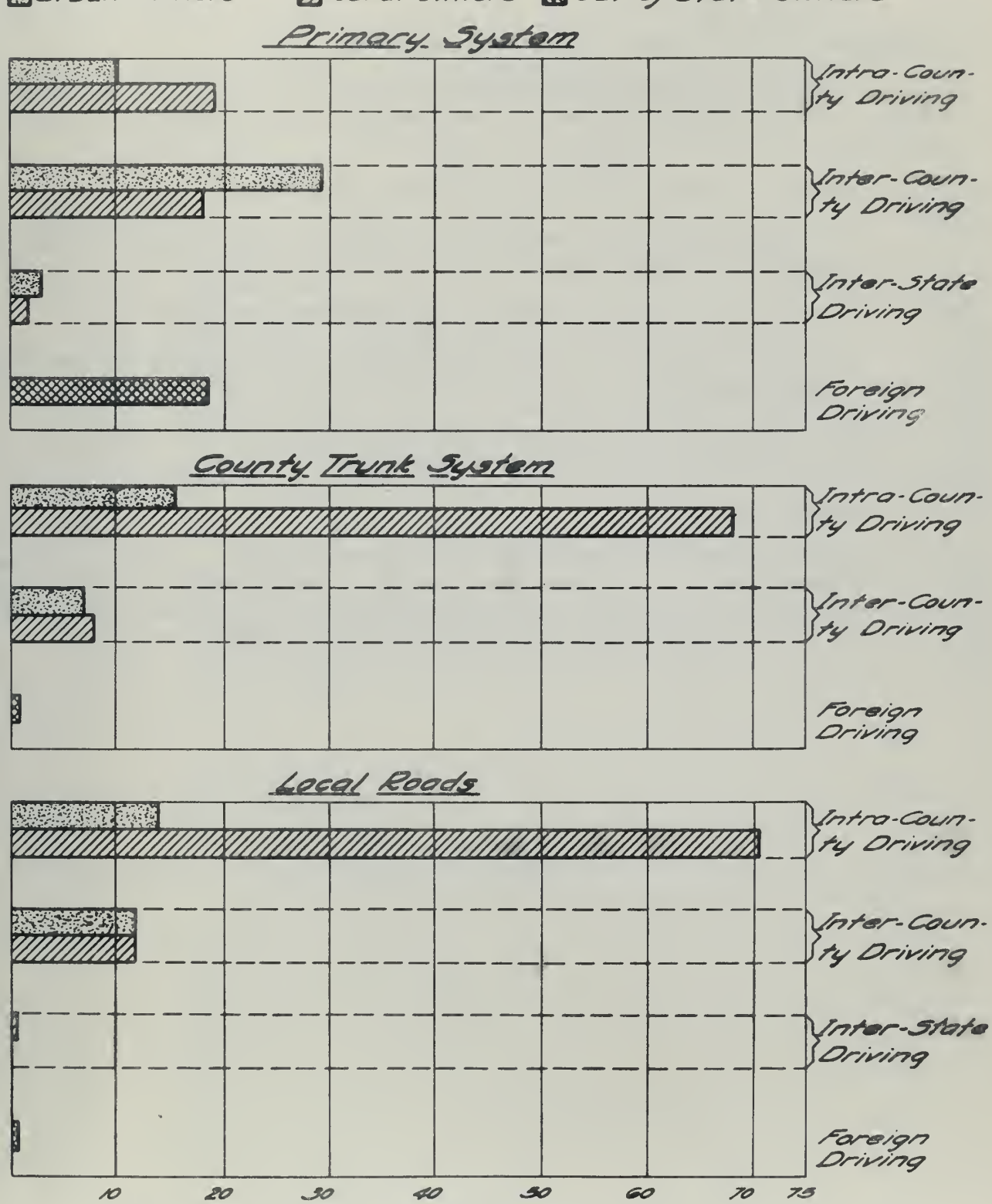
Continuing the trend of the next previous section, data are afforded in the Road Use Survey to determine the range of travel with respect to county lines and state boundaries. It is found that travel on the primary system intends a destination outside the county of origin in the majority of instances as opposed to the County Trunk System and Local Road System whereon the travel originates with intent to stay within the county in most cases. Information with respect to "foreign" traffic is entered to show further variation with respect to system usage. Detailed information respecting the discussion above is introduced as follows:

TABLE 70
SHOWING EXTENT OF TRAVEL BY LOCAL OWNERS AND OUT-OF-STATE OWNERS.

Resident Ownership Classification	Primary System					County Trunk System					Local Roads				
	Percent of Total Travel on System	Local Intra-County Travel	Local Inter-County Travel	Local Inter-State Travel	Foreign Owned Vehicle Travel	Percent of Total Travel on System	Local Intra-County Travel	Local Inter-County Travel	Local Inter-State Travel	Foreign Owned Vehicle Travel	Percent of Total Travel on System	Local Intra-County Travel	Local Inter-County Travel	Local Inter-State Travel	Foreign Owned Vehicle Travel
		%	%	%	%		%	%	%	%		%	%	%	%
Rural	38.8	50.0	46.0	4.0		77.0	69.8	10.2			76.1	91.0	9.0		
Urban	42.6	25.0	68.5	6.5		22.1	70.8	29.2			21.6	67.3	32.5	0.2	
Foreign	18.6				100.0	0.9				100.0	0.3				100.0
All Owners	100.0	30.0	47.0	4.4	18.6	100.0	84.7	14.4	0.1	0.9	100.0	85.6	14.1	0.1	0.3

PLATE XXXII

Showing Characteristic Driving With Respect To Termini Within County of Origin, Outside County of Origin and Within State, Outside County of Origin and Outside State And Foreign Traffic.



Significant data deriving from the tabulation and Plate XXXII are as follows:

A. Relating to Primary System Usage

1. Local traffic intent on a destination outside the county of origin comprises the biggest group classification.

2. Local traffic intent on a destination within the county of origin comprises the next largest group classification.

3. Foreign traffic comprises the next largest group and local traffic intent on a destination without the boundaries of the state makeup the smallest group.

B. Relating to County Trunk and Local Road System Usage

1. Traffic intent on a destination within the county of origin comprises the largest group classification.

2. Inter-county traffic comprises the next largest group.

3. Traffic intent on a destination outside the boundaries of the state is not readily apparent.

4. Foreign traffic comprises a negligible proportion of the traffic on the County Trunk System and the Local Road System.

C. General Conclusion

Another clue to the identity of "through" or primary traffic is afforded by the pattern manifest in tabulation for the primary system. In most cases it could be said that primary traffic comprehends a trip across a county line and that foreign traffic should constitute at least 15% of the whole.

CHAPTER XI

REVENUES AND EXPENDITURES FOR EACH OF THE SEVERAL ROAD AND STREET SYSTEMS

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NOTE

CHAPTER XI - REVENUES AND EXPENDITURES FOR EACH OF THE VARIOUS ROAD AND STREET SYSTEMS are estimations based on the best available information at the time of compiling this report.

The Montana Highway Planning Survey's tabulation and analysis of financial data were not completed before this publication was written. The final results of the Financial Study are included in a report completed in 1940.

XI
REVENUES AND EXPENDITURES FOR EACH OF THE VARIOUS ROAD AND STREET SYSTEMS

The financial survey was organized primarily to make a detailed study of the source of funds used in the construction and maintenance of the several highway systems. Other features of the study express the relation of highway finance to the entire fiscal set-up in the State and the political sub-divisions thereof. In all, the data afforded are of great interest for the reason that the tax structure in effect comprehends participation by each and every resident in the State.

11.01 Sources of Revenue — Revenues accrue to the State and its political sub-divisions as a circumstance of levies on property (including special assessments), special taxes and imposts, other general revenue, including licenses and permits, court fees, rentals, income taxes, etc., subventions, federal aids and grants, and borrowings. Further information respecting the type of taxes levied, governmental authorities involved, the specific purpose for which the taxes are levied and the control and equalization of the taxation procedure is given hereafter.

11.011 Property Tax — Property taxes are levied in accord with the classification controls listed immediately hereafter.

REVISED CODES OF MONTANA, 1921
CLASSIFICATION OF TAXABLE PROPERTY

1999. "Classification of property for taxation. For purpose of taxation the taxable property in this State shall be classified as follows:

"Class one. The annual net proceeds of all mines and mining claims, after deducting only the expenses specified and allowed by Section 2565 of the Revised Codes of Montana (2090); also where the right to enter upon land to explore or prospect or dig for oil, gas, coal, or mineral is reserved in land by any person or corporation, the surface title to which has passed to another, the assessor and the state and county boards of equalization shall determine the value of the right to enter upon said tract of land for the purpose of digging, exploring, or prospecting for gas, coal, oil or minerals, and the same shall be placed in the classification for the purpose of taxation.

"Class two. All household goods and furniture, including clocks, musical instruments, sewing machines, wearing apparel of members of the family, and all personal property actually used by the owner for personal and domestic purposes or for the furnishing or equipment of the family residence; all agricultural and other tools, implements and machinery, gas and other engines and boilers, threshing machines and outfits used therewith, automobiles, motor trucks and other power-driven cars, vehicles of all kinds, boats and all water craft, harness, saddlery and robes.

1/"Class three. Livestock, poultry, and all agricultural products, stocks of merchandise of all sorts; together with furniture and fixtures used therewith.

"Class four. All land, town and city lots, with improvements, manufacturing and mining machinery, fixtures and supplies, except as otherwise provided by the constitution of Montana.

"Class five. All moneys and credits, secured or unsecured, including all state, county, school district and other municipal bonds, warrants and securities without any deduction or offset; provided, however, that the terms, moneys, and credits as herein used shall not embrace the moneyed capital employed in the banking business by the banking corporation or individual in this State.

2/"Class six. The shares of stock of national banking associations and the moneyed capital employed in conducting a banking business by any other banking corporation, association or individual in this State. Such moneyed capital to be ascertained by deducting from the moneys and credits of such banking corporation, association, or individual, the amount of the deposits and any indebtedness representing money borrowed for use in said business and the value of the shares of any national banking association, to be ascertained by deducting the value of all real estate of such association.

"Class seven. All property not included in the six preceding classes.

"2000. Basis for imposition of taxes. As a basis for the imposition of taxes upon the different classes of property specified in the preceding section, a percentage of the true and full value of the property of each class shall be taken as follows:

"Class one. One hundred percent of its true and full value.

"Class two. Twenty percent of its true and full value.

"Class three. Thirty-three and one-third percent of its true and full value.

"Class four. Thirty percent of its true and full value.

"Class five. Seven percent of its true and full value.

"Class six. Forty percent of its true and full value.

"Class seven. Forty percent of its true and full value.

1/ Amended by implication by laws of 1931.

2/ Amended by implication by laws of 1929.

For taxation of building and loan associations, see Chapter 62, Laws of 1929.
For taxation of life insurance companies, see Chapter 63, Laws of 1929.

Revenues originating as a circumstance of the levy accrue to the state governmental agencies, the counties, the municipalities and the school district. In all cases the counties serve as the collection agency. Specific data respecting the incidence of the tax and the distribution on receipt thereof are as follows:

1. Revenues accruing to State Administrative Agencies

Year	Rate	Distribution
1936	1 3/4 mills, General	State General Fund
	2 3/4 mills, University	University Millage Fund
	10/12 mills, Educational	Bond Interest & Sinking Fund

2. Revenues accruing to County Administrative Agencies

Year	Rate	Distribution
1936	Not more than 16 mills	County General Fund
	Not more than 5 mills	County Road Fund
	Not more than 2 mills (With exceptions as follows: In those counties where the total lineal feet of bridges or bridge construction is in excess of 4,000 and the taxable value in said county is $4,000,000 or less, an additional levy of one mill may be made, and in counties where the total lineal feet is in excess of 6,000 and the taxable value not less than $4,000,000 nor more than $12,000,000, an additional levy of 2 mills or a total of 4 mills may be made.)	County Bridge Fund
	Not more than 6 mills	County Poor Fund
	Not more than 7 mills (Except in those counties where such levy will not produce $125 for each pupil residing in the county and regularly enrolled, in which case the levy may be raised to a point where it will raise $125.)	High School Fund
	Not less than 6 mills nor more than 8 mills, Schools	Common School Fund
	Levy as required	To pay interest and principal of each series of bonds - -.

3. Revenues accruing to administrative agencies in municipalities.

Year	Rate	Distribution
1936	Not more than 1.4% of assessed value in cities of 35,000 or more.	General Administration Fund
	Not more than 1 3/4% of the assessed value in other cities.	General Administrative Fund
	Not more than 2 mills, (In addition to above)	Maintenance of Public Parks
	Levy as required	To pay interest and principal of each series of bonds - -.

4. Revenues accruing to School Districts.

AD VALOREM		Distribution
1936	Not more than 10 mills (In addition to levies for school purposes cited hereinbefore.)	General School Fund
	In excess of 10 mills, pending approval of registered voters.	General School Fund
	Levy as required	To pay interest and principal of each series of bonds - -.

As regards indebtedness the state law prescribes as follows:

1. Counties

The total indebtedness of a county may not exceed 5% of the value of taxable property therein. No county shall incur any indebtedness or liability for any single purpose to an amount exceeding ten thousand dollars ($10,000) without the approval of the majority of the electors thereof, voting at an election to be provided by law.

2. Incorporated Cities and Towns

The total indebtedness of a city or town may not exceed 3% of the taxable property therein, provided, however, that the legislative assembly may extend this limit by authorizing municipal corporations to submit the question to a vote of the taxpayers affected thereby when such increase is necessary to construct a sewerage system or to procure a supply of water for such municipality which shall own and control said water supply and devote the revenues derived therefrom, to the payment of the debt.

3. School Districts.

See cities and towns above, excluding that portion of the statement relating to sewerage system and water supply.

As cited hereinbefore the several counties serve to collect all property taxes, the levies being imposed in accordance with the classification law. Assessment valuations are rated on an appraisal basis by the several county assessors. The State Board of Equalization serves to balance individual judgment in matters of equalization relating to real estate values, bank assessments, etc., in keeping with their appointment as a special "taxation and consolidation commission". Assessments relating to public utilities other than local public utilities are rendered by the board.

The total assessed valuation of all property and net proceeds of mines as allocated for the year 1936, the year of the study, is as shown on the table following.

TABLE 71A

Total assessment by Counties of Montana for the year 1936. 1/

County	Assessed values				
	Local property other than public utilities	Local property of public utilities	Public utilities allocated by State Board of Equalization	Assessments of net proceeds of mines by State Board of Equalization	Total valuation of counties
	Dollars	Dollars	Dollars	Dollars	Dollars
Beaverhead	11,832,993	480,450	3,059,276	10,039	15,382,758
Big Horn	7,969,577	91,263	3,580,231	785	11,641,856
Blaine	11,849,024	158,902	3,202,738	37,122	15,247,786
Broadwater	5,248,410	178,170	2,784,013	28,530	8,239,123
Carbon	13,336,945	604,147	4,114,774	79,744	18,135,610
Carter	8,741,047	-	1,575	-	8,742,622
Cascade	69,877,881	16,118,891	9,105,028	27,973	95,129,773
Chouteau	18,918,839	102,414	4,439,174	1,630	23,462,057
Custer	16,339,003	681,883	4,052,647	2,340	21,275,873
Daniels	7,734,687	33,753	1,411,249	2,345	9,182,034
Dawson	14,200,379	663,453	4,071,445	3,069	18,938,346
Deer Lodge	25,140,500	1,104,559	2,847,215	14,688	29,106,962
Fallon	6,064,095	178,292	2,198,773	169,161	8,610,321
Fergus	29,768,259	567,107	3,789,302	8,048	34,132,716
Flathead	23,651,465	1,345,215	5,733,734	116,652	30,847,066
Gallatin	26,160,140	2,055,001	7,107,243	475,352	35,797,736
Garfield	8,382,975	-	15,351	130	8,398,456
Glacier	6,670,975	579,585	4,382,818	1,910,747	13,544,125
Golden Valley	3,029,194	51,752	2,391,815	357	5,473,118
Granite	4,373,546	267,649	3,023,182	293,634	7,958,011
Hill	20,276,516	656,511	4,167,758	3,632	25,104,417
Jefferson	3,616,155	260,452	5,935,849	31,095	9,843,551
Judith Basin	13,336,399	94,399	3,540,793	433	16,972,024
Lake	10,939,435	47,150	1,272,580	-	12,259,165
Lewis & Clark	30,697,834	11,889,507	6,953,219	255,622	49,796,182
Liberty	5,158,724	28,438	1,283,128	27,484	6,497,774
Lincoln	7,414,979	388,399	5,511,476	20,705	13,335,559
Madison	8,625,314	1,725,551	2,117,330	195,082	12,663,277
McCone	9,926,710	8,060	485,141	1,929	10,421,840
Meagher	6,739,145	239,731	1,840,067	-	8,818,943
Mineral	1,273,930	408,383	4,988,870	-	6,671,183
Missoula	30,340,999	2,830,008	7,318,591	869	40,490,467
Musselshell	7,238,497	264,573	2,031,631	238,220	9,772,921
Park	15,804,449	1,404,307	4,046,364	48,590	21,303,710
Petroleum	4,278,853	61,056	278,209	263,085	4,881,203
Phillips	9,154,526	163,488	3,737,488	164,447	13,219,949
Pondera	12,160,114	202,217	2,348,829	269,699	14,980,859
Powder River	7,507,040	-	8,351	1,774	7,517,165
Powell	9,583,420	700,619	5,283,299	269,022	15,836,360
Prairie	5,417,404	79,229	3,137,645	-	8,634,278
Ravalli	11,223,797	210,387	1,520,674	4,474	12,959,332
Richland	10,653,535	103,514	1,995,239	3,177	12,755,465
Roosevelt	9,731,628	127,944	5,066,461	1,300	14,927,333

TABLE 71A (Continued)

County	Assessed values				
	Local property other than public utilities	Local property of public utilities	Public utilities allocated by State Board of Equalization	Assessments of net proceeds of mines by State Board of Equalization	Total valuation of counties
	Dollars	Dollars	Dollars	Dollars	Dollars
Rosebud	10,640,126	191,075	5,758,335	599,848	17,189,384
Sanders	6,557,223	5,199,407	5,850,895	-	17,607,525
Sheridan	12,784,655	65,797	1,895,981	2,588	14,749,021
Silver Bow	51,839,075	10,077,115	7,755,960	3,180,840	72,852,990
Stillwater	7,706,651	2,326,967	2,335,451	12,425	12,381,494
Sweet Grass	8,014,062	162,856	2,194,551	-	10,371,469
Teton	13,511,767	122,337	3,503,585	2,728	17,140,417
Toole	10,364,192	684,168	4,703,114	1,010,771	16,762,245
Treasure	3,728,113	24,480	1,239,796	-	4,992,389
Valley	16,459,174	286,390	4,332,272	18,730	21,096,566
Wheatland	7,674,057	422,659	3,199,218	-	11,295,934
Wibaux	4,827,475	13,855	1,111,648	1,281	5,954,259
Yellowstone	50,165,838	1,626,499	8,573,639	-	60,365,976
The State	774,661,745	68,560,014	198,635,020	9,812,196	2/1,051,668,975

1/ The various values given by counties and not by population groups, because there appeared to be no arbitrary basis for the distribution.

2/ These figures have been reconciled with the State Board of Equalization, and represent 100% of the true and correct values.

The total taxable value of the state at large as allocated for the year 1936 is as shown by the table following:

TABLE 71B

Total assessment by Counties of Montana for the year 1936. 1/

County	Taxable Values				Total valuation of counties
	Local property other than public utilities	Local property of public utilities	Public utilities allocated by State Board of Equalization	Assessments of net proceeds of mines by State Board of Equalization	
	Dollars	Dollars	Dollars	Dollars	Dollars
Beaverhead	3,499,185	148,513	1,223,708	10,039	4,881,445
Big Horn	2,383,781	23,734	1,428,319	785	3,836,619
Blaine	3,491,550	46,446	1,273,754	37,122	4,848,872
Broadwater	1,588,876	44,275	1,111,571	28,530	2,773,252
Carbon	4,110,904	202,927	1,632,267	79,744	6,025,842
Carter	2,641,389	-	630	-	2,642,019
Cascade	19,819,955	4,570,580	3,587,154	27,973	28,005,662
Chouteau	5,570,002	27,016	1,719,541	1,630	7,318,189
Custer	4,845,938	242,431	1,615,438	2,340	6,706,147
Daniels	2,284,301	8,765	563,667	2,345	2,859,078
Dawson	4,230,964	190,425	1,623,314	3,069	6,047,772
Deer Lodge	7,435,577	301,234	1,121,841	14,688	8,873,340
Fallon	1,803,769	47,284	879,509	169,161	2,899,723
Fergus	8,829,126	155,517	1,503,783	8,048	10,496,474
Flathead	6,917,291	400,015	2,293,493	116,652	9,727,451
Gallatin	7,669,609	577,580	2,807,956	475,352	11,530,497
Garfield	2,518,210	-	6,140	130	2,524,480
Glacier	1,990,580	161,181	1,753,127	1,910,747	5,815,635
Golden Valley	936,370	14,472	955,527	357	1,906,726
Granite	1,365,027	68,505	1,205,793	293,634	2,932,959
Hill	5,905,339	178,485	1,651,760	3,632	7,739,216
Jefferson	1,178,911	64,808	2,369,781	31,095	3,644,595
Judith Basin	3,989,900	24,257	1,411,182	433	5,425,772
Lake	3,260,848	13,115	509,032	-	3,782,995
Lewis & Clark	7,999,423	3,407,763	2,731,059	255,622	14,393,867
Liberty	1,513,161	7,633	511,923	27,484	2,060,201
Lincoln	2,168,763	140,472	2,204,590	20,705	4,534,530
Madison	2,665,995	506,825	843,007	195,082	4,210,909
McCone	2,954,712	2,363	194,056	1,929	3,153,060
Meagher	2,025,559	70,888	734,560	-	2,831,007
Mineral	364,433	125,553	1,994,938	-	2,484,924
Missoula	8,536,960	774,747	2,879,768	869	12,192,344
Musselshell	2,341,529	70,973	802,798	238,220	3,453,520
Park	4,666,240	368,782	1,604,076	48,590	6,687,688
Petroleum	1,282,734	18,416	111,284	263,085	1,675,519
Phillips	2,706,785	42,383	1,490,174	164,447	4,403,789
Pondera	3,525,022	62,578	929,755	269,699	4,787,054
Powder River	2,279,203	-	3,341	1,774	2,284,318
Powell	2,850,445	204,950	2,104,792	269,022	5,429,209
Prairie	1,633,145	21,901	1,254,562	-	2,909,608
Ravalli	3,264,105	57,141	598,008	4,474	3,923,728

TABLE 71B (Continued)

County	Taxable Values				Total valuation of counties
	Local property other than public utilities	Local property of public utilities	Public utilities allocated by State Board of Equalization	Assessments of net proceeds of mines by State Board of Equalization	
	Dollars	Dollars	Dollars	Dollars	Dollars
Richland	3,162,434	23,815	796,900	3,177	3,986,326
Roosevelt	2,834,897	34,365	2,025,236	1,300	4,895,798
Rosebud	3,218,823	54,677	2,303,334	599,848	6,176,682
Sanders	1,951,207	1,484,373	2,337,699	-	5,773,279
Sheridan	3,730,563	18,525	757,349	2,588	4,509.025
Silver Bow	14,776,518	2,228,167	2,996,467	3,180,840	23,181,992
Stillwater	2,264,552	683,608	928,817	12,425	3,889,402
Sweet Grass	2,399,526	43,644	873,936	-	3,317,106
Teton	3,899,671	31,170	1,396,551	2,728	5,330,120
Toole	3,084,961	224,752	1,881,245	1,010,771	6,201,729
Treasure	1,115,484	6,854	495,918	-	1,618,256
Valley	4,798,321	70,936	1,723,741	18,730	6,611,728
Wheatland	2,242,982	107,349	1,274,303	-	3,624,634
Wibaux	1,448,569	3,462	444,036	1,281	1,897,348
Yellowstone	14,548,836	435,694	3,356,897	-	18,341,427
The State	226,522,960	18,846,324	78,833,407	9,812,196	2/334,014,887

1/ The various values given by counties and not by population groups, because there appeared to be no arbitrary basis for the distribution.

2/ These figures have been reconciled with the State Board of Equalization.

Revenues deriving as a consequence of the general property tax levy during the year ending June 30, 1936 are as follows:

TABLE 72
REVENUES ACCRUING TO THE STATE AND ITS POLITIC L SUB-DIVISIONS
HAVING ORIGIN WITH PROPERTY TAX LEVY
For Year Ending June 30, 1936.

Destined for Expenditure by -	General Property Tax Revenue				Specific Commitments		Available for Administrative Purposes
	Current Taxes	Delinquent Taxes	Special Assessments	Total Revenue	For outstanding Debt	For Other Units	
State Administrative Agencies	1,927,241	509,727	91,071 1/	2,516,968	632,045 197,193 829,238		1,295,196 392,534 1,687,730
Administrative Agencies of the Several Counties	7,189,842	2,781,280	52,910 2/	9,971,122	755,686 593,948 1,349,634		6,434,156 2,187,332 8,621,488
Administrative Agencies of Incorporated Cities and Towns Having a Population of 1,000 or less	210,693	106,310	4,350	321,353	77,863 30,530 493 108,886		132,830 75,780 3,857 212,467
Administrative Agencies of Incorporated Cities and Towns Having a Population of 1,001 to 2,500	317,668	162,691	1,945	482,304	112,698 57,830 170,528		204,970 104,861 1,945 311,776
Administrative Agencies of Incorporated Cities and Towns Having a Population of 2,501 to 5,000	129,605	60,827	15,346	205,778	42,331 15,329 1,002 58,662		87,274 45,498 14,344 147,116
Administrative Agencies of Incorporated Cities and Towns Having a Population 5,001 to 10,000	322,473	86,018	60,920	469,411	40,122 12,844 52,966		282,351 73,174 60,920 416,445
Administrative Agencies of Incorporated Cities and Towns Having a Population of 10,001 to 25,000	599,678	257,201	22,545	879,424	66,080 39,329 105,409		533,598 217,872 22,545 774,015
Administrative Agencies of the City of Great Falls (29,431 population)	338,011	69,449	8,843	416,303	67,602 13,890 81,492		270,409 55,559 8,843 334,811
Administrative Agencies of the City of Butte (38,968 population)	459,573	109,825	9,867	579,265	202,212 48,323 250,535		257,361 61,502 9,867 328,730
Administrative Agencies of the Several School Districts	8,269,357	2,468,122		10,737,479	1,440,054 430,146 1,870,200		6,829,303 2,037,976 8,867,279
All Civil Administrative Agencies of the State of Montana	19,764,141	6,691,450	123,816	26,579,407	3,436,693 1,439,362 2,286 4,877,550		16,327,448 5,252,088 122,321 21,701,857

1/ A special property tax levied in the interest of administrative activities of the Livestock Board.
See Sec. 11.012; not included with revenues deriving from property tax.

2/ Road and Poor Tax, levied in the interest of funds implied.
See Sec. 11.012; not included with revenues deriving from property tax.

11.012 Special Taxes and Imposts

Special taxes and imposts afford revenues deriving from levies on livestock in the interest of the welfare of the livestock industry, an operative license fee attendant on oil production, and Road and Poor Taxes accruing to County agencies for expenditure as implied. Other particulars relating to collection and administration of the funds are as follows:

1. Revenues accruing to State Administrative Agencies

Year	Rate	Distribution
1936	Not more than 1 mill on sheep and 1½ mills on other livestock	Livestock Commission
	Not more than 1½ mills on sheep and 1 mill on other livestock	Bounty Fund
	Not to exceed 1½ mills on all livestock	Livestock Sanitary Board
	2% of the gross value of oil production	50% to General Fund 25% to High Schools 25% to Common School Equalization Fund

2. Revenues accruing to County Administrative Agencies

Year	Rate	Distribution
1936	Road Tax, per Chapter 141, Sec. 1617 of the Revised Codes of Montana, 1935. "There is established a general road tax of two dollars ($2) per annum on each male person over the age of twenty-one (21) years, and under the age of fifty (50) years, inhabitant within the county, and payable by each person liable therefor at any time within the year - - - -."	County Road Fund
	Poor Tax, per Chapter 345, Sec. 4465.4 of the Revised Codes of Montana, 1935. "To provide for the care and maintenance of the indigent, sick or the otherwise dependent poor of the county; erect and maintain hospitals therefor, or otherwise provide for the same, and to levy the necessary tax therefor per capita, not exceeding two dollars ($2) and a tax on property not exceeding three-fifths (3/5) of one percent (1%) on either of such levies when both are not required, and to expend not to exceed five percent (5%) of any such levy for the collection of said tax or any part thereof."	County Poor Fund

The counties serve to collect the taxes levied in the interest of the Livestock Administrative Agency in accord with practice prescribed by statute. The oil production license fee, the revenues from which accrue to the State, is administered by the State Board of Equalization.

Revenues realized as a circumstance of the Special Tax Levy are as follows:

Table 73
Revenues Accruing to the State and its Political Sub-divisions as a Circumstance of Special Tax Levies and Imposts for the Year Ending June 30, 1936

Destined for Expenditure by -	Revenue	Specific Commitments	Available for Administrative Purposes
Administrative Agencies of the State	124,013		124,013
Administrative Agencies of the Several Counties	52,910	791	52,119
All Civil Administrative Agencies of the State	176,923	791	176,132

11.013--Motor Vehicle Imposts

Motor vehicle imposts are levied in the interest of the State and County road building agencies, the policing division of the Montana Highway Department and the Montana Railroad and Public Service Commission. Further particulars respecting the collection, control and equalization of these revenues are as follows:

1. Revenues accruing to the State Administrative Agencies

Year	Rate	Distribution
1936	Gasoline License Law; providing a license tax equal in amount to 5 cents per gallon on all gasoline manufactured within the State, and on all gasoline shipped into the State.	75% to State Highway Fund 25% to Gasoline License Drawback Fund.
	Motor Vehicle License Fee; providing a license tax as follows:	County Road Funds less State Administrative Costs and special road funds of the City of Butte
Minimum -	$30.00 for dealers in motor vehicles other than motor cycles	
	5.00 For each set of number plates in excess of 2 and up to 6 sets	
	2.00 For each set of number plates in excess of 6 sets	
	15.00 For dealers in motor cycles	
	10.00 For dealers in auto accessories except auto dealers	
	5.00 For motor vehicles other than trucks weighing 2850 pounds or under	

Year	Rate	Distribution
	$ 5.00 For motor vehicles other than trucks weighing 2850 pounds or less	
	10.00 For motor vehicles other than trucks weighing over 2850 lbs.	
	10.00 For electrically driven passenger vehicles	
	2.00 For all motor cycles	
	5.00 For trucks of 1 ton capacity and under	
	10.00 For trucks over 1 ton and including 1½ ton capacity	
	22.50 For trucks over 1½ tons and including 2 tons capacity	
	37.50 For trucks over 2 tons and less than 3 tons capacity	
	60.00 For trucks of 3 tons and less than 5 tons capacity	
	200.00 For trucks of 5 tons capacity and over Buses shall be classed as trucks and licensed accordingly	
	2.00 For trailers and semi-trailers over 1 ton. For all motor vehicles, trailers and semi-trailers when not equipped with pneumatic tires, 25% additional.	
	1.00 For bicycles with motor attachments.	

Motor vehicle title registration @ $1.00	County Road Fund Less State Administrative Costs
Driver's License @ $0.75	Highway Patrol
Motor Carrier Fees	Motor Carried Fund

Class A - (Motor carrier between fixed termini, or over regular route, on approved schedules and approved tariffs.)

Registration fees - The same fee is paid as for private trucks.

Special fees:

Operating authority - Application fees, $15; certificate fees, $2; filing tariffs, $2 each; filing schedules, $2 each.

Highway compensation fee, $10 per each vehicle annually (fiscal year) (Seasonal operation, $5 per vehicle).

Gross revenue tax - ½% reported quarterly, annual minimum $30 per vehicle.

Class B - (Motor carrier not over regular route or between fixed termini on approved tariffs).

Registration fees - The same fee is paid as for private trucks.

Special fees - The same as for Class A, except no filing of Schedule fee.

Class C - (Motor carrier for hire under contract, charter, agreement or undertaking).

Registration fees - The same fee is paid as for private trucks.

Special fees - The same as for Class A, except no filing of schedule fee or filing of tariff fee, and the minimum gross revenue fee is $15 instead of $30.

Interstate operated - The fees are the same as for Class C intrastate operated vehicles.

Property Carriers

The fees are the same as for passenger carriers.

Transfer tags and certificate of title fees are made up from collections according to statutory provisions; a charge of one dollar ($1.00) shall be made for issuance of original certificate of ownership, which shall be collected by the County Treasurer the first time any vehicle is registered by any owner and remitted to the Registrar of Motor Vehicles with application for registration. Upon a transfer of registration by the owner, there shall be paid to the Registrar of Motor Vehicles a transfer fee of one dollar ($1.00) A fee of twenty-five cents (.25¢) shall be paid for filing satisfactions of chattel mortgaged or conditional sales' contracts. A fee of fifty cents (.50¢) shall be paid the Registrar for filing chattel mortgages. Conditional sales contracts or assignments thereof and issuing certificates to copies of chattel mortgages or conditional sales contracts also require a fee of fifty cents (.50¢).

2. Revenues accruing to County Administrative Agencies

Year	Rate	Distribution
1936	Motor vehicle registration license fees. All license or registration fees are credited to the counties in which the vehicles are registered, excluding costs attendant on State administration of the law.	County Road Fund

3. Revenues from motor vehicle imposts to the City of Butte

Year	Rate	Distribution
1936	Motor vehicle registration fees, 50% of the net fees derived from the registration of motor vehicles, the owners of which reside within the boundaries of any incorporated city of Montana, having a population of 35,000 or more, - - - - - shall be segregated from other county road funds and credited to the city road fund.	City Road Fund

Each of these several motor vehicle imposts are collected in a manner prescribed by law as follows:

1. Gasoline License Tax

The State Board of Equalization administers all affairs incident to the collection of Gasoline License Tax revenues. The tax is levied on gasoline at source, either within the state or outside the state. Seventy-five percent of all collections go to the State Highway Fund and twenty-five to the Gasoline License Drawback Fund. If the Drawback Fund is insufficient, the State Treasurer shall transfer from the Highway Fund. At the end of the fiscal year all money in the Drawback Fund shall be transferred to the Highway Fund. "Drawbacks", as cited hereinbefore, consist of Gasoline License Tax Refunds for gasoline used for purposes other than highway use. Costs attendant on administration of the tax law are defrayed by moneys from the State Highway Fund.

2. Motor Vehicle License Tax

Quoting in part, Section 1760, Revised Codes of Montana, 1935
1760. "Registration fees--disposal of proceeds--fee for half year--dealers' registration and transfer thereof--public owned vehicles exempt from fees.

"Registration fees shall be paid upon registration or re-registration of motor vehicles, trailers, semi-trailers and dealers in motor vehicles or automobile accessories in accordance with this act, as follows:

"Dealers in motor vehicles other than motor cycles, a minimum fee of thirty dollars ($30.00) which shall entitle such dealer to two (2) sets of number plates and five dollars ($5.00) additional fee for each additional set of number plates up to six (6) sets, and two dollars ($2.00) additional fee for each additional set of number plates, as may be applied for by such dealer; provided, that each dealer be required to furnish the registrar of motor vehicles a statement showing the makes of motor vehicles handled by him, and the total number of each make sold by him during the preceding year, and that he not be issued a license unless he so conforms;

"Dealers in motor cycles, fifteen dollars ($15.00);

"Dealers in automobile accessories, except automobile dealers, ten dollars ($10.00);

"Motor vehicles, weighing twenty-eight hundred and fifty (2850) pounds or under, other than motor trucks, five dollars ($5.00);

"Motor vehicles, weighing over twenty-eight hundred and fifty (2850) pounds other than motor trucks, ten dollars ($10.00);

"Electrically driven passenger vehicles, ten dollars (10.00);

"All motor cycles, two dollars ($2.00);

"Trucks of one (1) ton capacity or under, five dollars ($5.00);

"Trucks over one (1) ton and up and including one and one-half (1½) tons capacity, ten dollars ($10.00);

"Trucks over one and one-half (1½) tons and up and including two (2) tons capacity, twenty-two dollars and fifty cents ($22.50);

"Trucks over two (2) and less than three (3) tons capacity, thirty-seven dollars and fifty cents ($37.50);

"Trucks of three (3) tons and less than five (5) tons capacity, sixty dollars ($60.00).

"Trucks of five (5) tons capacity and over, two hundred dollars ($200.00);

"Buses shall be classed as motor trucks and licensed accordingly;

"Trailers and semi-trailers, over one thousand (1000) pounds and not over one (1) ton, two dollars ($2.00);

"Trailers and semi-trailers, over one (1) ton, five dollars ($5.00);

"All rates to be twenty-five percent (25%) higher for motor vehicles, trailers and semi-trailers, when not equipped with pneumatic tires;

"Bicycles with motor attachment, one dollar ($1.00).

"All license or registration fees collected by the county treasurer of the county in which any motor vehicle is registered shall be credited to the motor vehicle license fund of said county. The cost of making and mailing license plates and identification marks, certificates and other expenses of operating the motor vehicles department of the State of Montana shall be prorated by the registrar of motor vehicles among the counties of the state in proportion to the number of cars registered in each county, and shall bill each county therefor, by verified claim, and each county shall thereupon pay the amount so charged out of said motor vehicle license fund; provided, however, that each county shall receive credit for its pro rata share of any fees paid to the registrar of motor vehicles, and provided further that the county treasurer shall retain ten percent (10%) of all license fees in said motor vehicle fund until he has been billed by the registrar as aforesaid. The remainder of the funds in said motor vehicle license fund shall be used as follows:

(a) "Fifty per cent (50%) of the net fees derived from the registration of motor vehicles, the owners of which reside within the boundaries of any incorporated city of the state of Montana, having a population of thirty-five thousand (35,000), or more, according to federal census of 1930, shall be held by county treasurer and segregated from other county road funds and be designated as "City road fund," to be used in city from which fees were derived for the construction of permanent streets within the incorporated limits of such city.

(b) "The fees held in the city road fund, as hereinabove provided, shall be used by the city council of such city having the population of thirty-five thousand (35,000), or more, according to the federal census of 1930, only for the construction of permanent highways and streets within the boundaries of such incorporated city. Provided, that all construction of public highways and streets, the cost of which is to be paid out of the fund derived from the license fees as herein provided, shall be under the supervision of the county surveyor of the county within whose boundaries such city is situated, subject to the control of the said city council and surveyor to designate the public highway or street upon which the work is to be done, and the type of pavement to be used, and provided further, that the cost of supervision of the county surveyor shall not exceed five per cent (5%) of the cost of said work.

(c) "The net fees derived from the registration of motor vehicles shall be by the registrar of motor vehicles transmitted to, and paid over to the county treasurer of the county from which the registration fee came, such fees excepting apportionment to city road fund, to be used by said county for the construction, repair and maintenance of all public highways, except state and federal highways, within the boundaries of said county, including city streets forming component parts of arterial highways within the corporate cities of less population than thirty-five thousand (35,000), according to the federal census of 1930, within the boundaries of said county.

"If any dealer, or motor vehicle, or trailer, or semi-trailer is originally registered six (6) months after the time of registration as set by law, the registration fee for the remainder of such year shall be one-half ($\frac{1}{2}$) of the regular fee above given.

"A dealer in motor vehicles or automobile accessories who shall maintain more than one (1) place of business or who shall maintain any branch establishment or establishments, must register and pay a registration fee for each such place of business or establishment.

"A registered dealer, who may sell or dispose of his entire business to any other person, may have his certificate of registration transferred to such purchaser upon filing with the registrar of motor vehicles a statement containing the name of the registered dealer, the number under which such dealer is registered, the name of the purchaser, and the location of the place of business so sold. Upon the filing of such statement, accompanied by a filing fee of one dollar ($1.00), the registrar of motor vehicles shall note upon the registration record of such dealer the change of ownership. But no certificate of registration can be transferred unless the entire business of the dealer holding such certificate of registration be sold and disposed of, and no such certificate of registration can be transferred to any person other than the purchaser of such business.

"The provisions of this act with respect to the payment of registration fees shall not apply to or be binding upon motor vehicles, trailers or semi-trailers owned or controlled by the United States of America or any state, county or city, but in all other respects the provisions of this act shall be applicable to and binding upon motor vehicles, trailers and semi-trailers.

1760.1. "Licensing of vehicles from out of state. Every motor or other vehicle of the types required to be licensed, under the laws of this state, which shall enter this state with proof of evidence that it has paid a license fee for the ensuing year, under the laws of some other state or foreign government, shall immediately after entering the state of Montana, obtain a license at the first county seat, for operation in this state, in accordance with the provisions of this act.

1760.2. "Registration of foreign vehicles--application. The owner of such registered foreign motor vehicle shall, upon a form to be prepared and furnished by the registrar of motor vehicles, apply to the registrar of motor vehicles in this state, the sheriff at the first county seat entered, who shall be a deputy registrar of motor vehicles, or such other agency or agencies as may have been designated by the registrar of motor vehicles for registration of such vehicle. Such form or application shall state, in addition to other matters that may be required, the following: The name and permanent business and residence address of the owner, number and description of the license already issued to the car.

1760.3. "Thirty-day license issued for foreign vehicles, when. Upon receipt of the application duly signed, the registrar of motor vehicles, or his agency, if satisfied as to the truthfulness of the facts therein stated, shall, without charge, furnish to the applicant a registration certificate or device, or an identification form, indicating that the holder thereof has complied with the requirements of this act, and containing such other matters as may be deemed or considered necessary by it, the registrar of motor vehicles. Such Certificate or device, so issued, shall be valid and authorize the operation of vehicles so registered within this state, without any charge or license fee, for a period of thirty (30) days from the date of issuance, but not beyond the current calendar year.

"If the owner of the motor vehicle shall furnish satisfactory proof that he is not engaged in gainful occupation or business enterprise, but is in the state of Montana for recreational travel only, his foreign registration certificate may be extended an additional thirty (30) days without charge.

1760.4. "Certificate to be displayed. The vehicle so registered under this act shall carry the certificate, or device, or identification, in plain sight in or upon said vehicle at all times when said vehicle is being operated or driven upon the public highways of this state.

1760.5. "Filing of applications for license to operate foreign vehicles. The registrar of motor vehicles shall file said application for registration by non-resident owners in his office and suitably index the same and keep and maintain filings and indices with reference thereto, which shall be open to inspection by the public during reasonable business hours.

1760.6. "Registrar of motor vehicles to enforce act. The registrar of motor vehicles is hereby authorized and empowered to designate and shall appoint and maintain convenient agencies for the purpose of carrying into effect the provisions of this act, and for such purpose may designate county, city or town officers, or public societies, or clubs, or other civic activities, banks, or other business institutions as agencies therefor, and may establish and promulgate rules and regulations to carry out the purpose and intent of this act.

1760.7. "Foreign vehicles used in gainful occupation. Before any foreign licensed motor vehicle shall be operated on the highways of this state for compensation or profit, or the owner thereof is using the vehicle while engaged in gainful occupation or business enterprise, in the state of Montana, including highway work, the same shall be registered and licensed in this state in the same manner as is required in the case of domestic owned vehicles of similar

character not heretofore registered or licensed, and if the registrar of motor vehicles is satisfied as to the facts stated in the application, he shall register and license such vehicle and assign thereto an appropriate certificate, emblem or device, which shall at all times be displayed upon such vehicle, when operated or driven upon roads and highways of this state, during the period of the life of such license.

1760.8. "Foreign vehicles to display number plates. All foreign registered and licensed motor vehicles shall also carry in plain sight thereon the license plates or device from such other state or foreign country.

1760.9. "Purpose and intent of act. This act shall be solely for the purpose of registration and identification of vehicles operated in this state that have paid a license in another state or foreign country, and otherwise than as herein specifically set forth shall not be construed as a repeal of any acts or parts of acts having to do with the registration or licensing of automobiles within the state of Montana.

1760.10. "Penalties. Any person operating a vehicle in violation of the intent and purpose of this act shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine of not less than ten dollars ($10) or more than fifty dollars ($50), or confined in the county jail for not more than thirty (30) days, or both such fine and imprisonment."

3. Motor Vehicle Title Registration

Fees are paid to County Treasurer to defray costs of title registration and record of transfers. To facilitate discussion these revenues are included with Motor Vehicle License Tax receipts.

4. Drivers' License

Collections are made by the several County Treasurers, the moneys reverting to the Highway Patrol Fund.

5. Motor Carrier Fees

Collections are made by the Board of Railroad and Public Service Commissioners, the funds being used to defray expenses incident to the operation of that board.

Further particulars with respect to the revenues deriving from motor vehicle imposts are as follows:

TABLE 74
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF MOTOR VEHICLE IMPOSTS
For Yeer Ending June 30, 1936

For Expenditure By -	Motor Vehicle Impost Revenues					Specific Commitments		Aveileble for Administretive Purposes
	Gasoline Licenae Tex	Motor Vehiole License Tax 1/	Drivers' License	Motor Carrier Fees	Totel Revenue	For Outstanding Debts	For Other Units	
Stete Administretive Agencies	4,192,683	1,239,601	147,346	33,198	5,612,828	306,339	1,113,555 2/	3,806,344 126,046 147,346 33,198 4,192,934
Administretive Agencies of the Several Counties		1,079,992 3/						1,079,992
Administrative Agencies of the City of Butte		33,563 4/						33,563
All Civil Administretive Agencies of the State	4,192,683	1,239,601	147,346	33,198	5,612,828	306,339	1,113,555	5,306,489

1/ Including fund deriving from Motor Vehicle Title Registration.
2/ Committed to counties and the city of Butte es e subvention (Totel collections less cost of edministration).
3/ Revenues deriving from Motor Vehicle License Tex Lew for expenditure by the several counties.
4/ Revenues deriving from Motor Vehicle License Tax Lew for expenditure by the City of Butte.

11.014 Other General Revenue Receipts

Other general revenue receipts accruing to the state and the several political sub-divisions thereof are as follows:

1. Revenues accruing to the State

a. Various and sundry fees deriving from the imposition of license taxes, those being a levy on cement and plaster producers and dealers, a levy on coal miners and dealers, a levy on the production of carbon black, a levy on the metal producers (Metal Mines License Tax), a levy on the net profit of all corporations doing business within the state, a levy on appurtinant features of the beer industry, a levy on the gross income of the sale of electricity, a levy on the gross income of intrastate telegraph business, a levy on freight lines, a levy on chain stores, a levy on cigarette dealers and a levy on contractors.

b. Special Receipts including the proceeds of the sale of liquor in state owned liquor stores, the sale of lands, grazing rights, etc., and the proceeds of the personal income tax.

c. Revenues originating with the rental of state lands and state properties.

d. Miscellaneous revenues deriving from several items including a levy on the gross earnings of express companies, a levy on the value of the rolling property of sleeping car companies, a levy on insurance companies, an inheritance tax, a levy on government land sales, federal oil royalties, state oil royalties, sundry fees, fines and forfeitures, income over expenditure for public enterprises, gifts and grants, and other public revenue.

2. Revenues accruing to the several counties

a. Revenues originating with the rental of county property including that deeded by pensioners, rental of equipment, interest on general deposits, interest on delinquent tax collections and miscellaneous interest.

b. Miscellaneous receipts including fines, fees and forfeitures, the sale of land, sale of produce from poor farms, revenues incident to the operation of the office of the Clerk of Court, etc.

3. Revenues accruing to the several municipalities

a. Various fees originating with the imposition of license taxes on business such as a levy on cigarette dealers, a levy on operators of pool halls, theaters, taxis, chauffeurs, milk dealers, etc.

b. Revenues originating with the rental of city owned lands, equipment and buildings.

c. Revenues from miscellaneous receipts such as fees, fines and forfeitures interest on general deposits, sale of lands, etc.

4. Revenues accruing to the several school districts

a. Miscellaneous receipts including sale of property, rentals, fines, gifts and bequests.

Additional data relating to the incidence of these taxes, levies, etc. and the distribution thereof are as follows:

1. Revenues accruing to the State

Year	Rate	Distribution
1936	LICENSE TAXES	General Fund
	License tax on cement producers and dealers $0.04 per barrel	
	License tax on plaster producers and dealers $0.05 per ton	General Fund
	License tax on production of carbon black 1/8 of one cent per pound	General Fund
	License tax levy on the gross value of metal mines production; $1.00 on first $100,000 1/4% of next $150,000 1/2% of next $150,000 3/4% of next $100,000 1% on all over $500,000	50% to Common Schools Equalization Fund (SPSGF) 1/
	License tax levy on all corporations, 2% of net income	75% to General Fund 25% to Common Schools Equalization Fund (SPSGF)
	Beer License and Tax Brewer $750.00 Wholesale $300.00 Retail $200.00 Club $ 50.00 Common Carrier $ 25.00 Fair Assoc. $ 10.00 per day Minimum fee $ 25.00 Barrelage tax per barrel of 31 gal. $ 1.00	95% to General Fund 5% to Relief Fund
	Electrical Energy Tax, 5/8 of 1% of gross income from sale of electrical energy	90% to General Fund 5% to Montana Relief Fund 5% to State Public School General Fund

Year	Rate	Distribution
1936	Natural Gas, 3/8 of one cent per thousand cubic feet distributed in the state	95% to General Fund 5% to Montana Relief Fund
	Telegraph License, 2% of gross income from intrastate business	90% to General Fund 5% to State Public School General Fund 5% to Montana Relief Fund
	Freight Lines, Ad Valorem	State Public School General Fund
	Chain stores, graduated from $2.50 to $30.00 according to number of stores owned	50% to General Fund 50% to Common Schools Equalization Fund (SPSGF)
	Cigarette Dealer, $5.00 annually	General Fund
	Contractors, three classes Class A - $200.00 first year $100.00 thereafter Class B - $100.00 first year $ 50.00 thereafter Class C - $ 10.00 first year $ 5.00 thereafter	General Fund

1/ When there is shown a distribution of revenue to the Common Schools Equalization Fund with a notation (SPSGF) appearing immediately thereafter, it is to indicate that, in line with the provisions of H.B. 147, revenues are credited to the Equalization Fund until the stipulated figure of $150,000 is accumulated each fiscal year and after that the revenues are to be credited to the State Public School General Fund.

N.B. The amount of all license taxes collected during each fiscal year required to be deposited to the credit of the State General Fund is set aside in a special fund in sufficient amount to pay interest and principal due and payable during the next following fiscal year upon the State funding Bonds authorized under Chapter 10, laws of twenty-third Legislative Assembly (1933).

All the several license tax laws mentioned immediately hereinbefore are administered by the State Board of Equalization.

Year	Rate	Distribution
1936	Relating to the sale of liquor; In accord with market prices to render a profit for distribution to:	
	33 1/3% up to $300,000	General Fund
	15% up to $100,000	Water Conservation Administration Fund.
	51 2/3% to Relief Fund and balance after above is provided	
	Sale of lands, grazing rights to highest bidder	General Fund
	Personal Income Tax, graduated from 1% to 4% on net income	55% to General Fund 20% to State Public School General Fund 20% to Common School Equalization Fund 5% to Montana Relief Fund

The Montana Liquor Control Act is administered by the Montana Liquor Control Board.

Sales of public lands are administered by the administrative agencies involved.

The personal income tax is administered by the State Board of Equalization.

RENTALS

Year	Rate	Distribution
1936	Rental of lands and State properties, to highest bidder or in accordance with accepted terms.	General Fund, School Fund or to Operating Expense of Administering Agency

MISCELLANEOUS RECEIPTS

Year	Rate	Distribution
1936	Express Companies, 4% of gross earnings.	General Fund
	Sleeping Car Companies, 1½% of value.	General Fund
	Insurance Companies, Admission Fund, $300.00	General Fund
	Fee for filing annual statement, $25.00	
	Fee for publishing annual statement, $9.00	
	First $5,000.00 in premiums collected, 2½%	
	Premiums collected in addition to $5,000.00, 2%	
	¼ of 1% of premiums of direct fire-writing companies	Voluntary Firemen's Compensation Fund and Firemen's Disability Fund
	Inheritance tax, graduated depending on degree of consanguinity	15% Common School Equalization Fund 15% State Public School General Fund 70% Water Conservation Revolving Fund up to $350,000 after which the 70% goes to Relief Fund up to $250,000, after to General Fund
	Government Land Sales, 5% of amount	Permanent School Fund

Year	Rate	Distribution
1936	Timber Sales on State Lands	Permanent School Fund and Common School Interest and Income Fund
	Federal Oil Royalties	50% to Common School Equalization Fund 50% to State Highway Fund
	State Oil Royalties	Various School Funds
	Fees, Fines and Forfeitures, in accord with statutory provision and according to discretion of executive officer in respect to degree	Various Operative and Administrative Funds and General Fund
	Operations of State enterprises to render a profit from the operation and administration of -	Sundry Boards and to the General Fund

The State Board of Equalization administers affairs incident to levies on Express Companies, Sleeping Car Companies and the Inheritance Tax.

The State Auditor administers affairs incident to the levy on Insurance Companies.

Other receipts are administered by agencies implied in the description.

2. Revenues accruing to the several counties

RENTALS

Year	Rate	Distribution
1936	Rentals of County Lands in accord with accepted practice or to highest bidder	General Fund

MISCELLANEOUS RECEIPTS

Year	Rate	Distribution
1936	Fees, Fines and Forfeitures in accord with statutes and in degree commensurate with service rendered or degree of offense	General Fund or to Operating Fund of Administrative Agency
	Sale of County Properties, according to market value or to highest bidder	General Fund or to Operating Fund of Administrative Agency
	Clerk of Court Fees, costs incident to the affairs of the court	General Fund

3. Revenues accruing to the several municipalities

LICENSE TAXES

Year	Rate	Distribution
1936	License taxes and permits on business concerns in accord with local option	General Fund or Other Funds as Prescribed by Statute

RENTALS

Year	Rate	Distribution
1936	Rental Receipts from city-owned property in accord with local practice or to highest bidder	General Fund or Other Funds as Prescribed by Statute

MISCELLANEOUS RECEIPTS

Year	Rate	Distribution
1936	Receipts from Fines, Fees and Forfeitures rendered in accord with local statutory action and gifts and grants by individuals	General Fund or Other Funds as Prescribed by Statute

4. Revenues accruing to the several School Districts

MISCELLANEOUS RECEIPTS

Year	Rate	Distribution
1936	Fees, Fines and Forfeitures	School Fund
	Sale of Property to highest bidder	School Fund
	Rentals of School Property	School Fund
	Gifts and Bequests	As directed to School Funds

Further particulars with respect to the incidence of amounts of the receipts from other general revenue are as follows:

TABLE 75
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF OTHER GENERAL REVENUE RECEIPTS
For Year Ending June 30, 1936

[illegible]	Other General Revenue Receipts					Specific Commitments		Available for Administrative Purposes
	License Taxes	Special Receipts	Rental Receipts	Miscellaneous Receipts	Total Revenues	For Outstanding Debts	For Other Units	
State Administrative Agencies	[illegible]	4,447,611	230,354	57,075	4,926,182	219,323		141,488 4,277,942 230,354 57,075 4,706,859 219,323
Administrative Agencies of the Several Counties			76,212	161,423	237,635			76,212 161,423 237,635
Administrative Agencies of Cities Having a Population 1,000 or less	19,597		7,650	77,461	104,708			19,597 7,650 77,461 104,708
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	30,546		23,505	128,496	182,547			30,546 23,505 128,496 182,547
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	14,976			70,345	85,321			14,976 70,345 85,321
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	27,576			196,898	224,474			27,576 196,898 224,474
Administrative Agencies of Cities Having a Population of 10,001 to 25,000	53,548			147,350	200,898			53,548 147,350 200,898
Administrative Agencies of the City of Great Falls (Population 28,471)	16,751			134,188	150,939			16,751 134,188 150,939
Administrative Agencies of the City of Butte (Population 30,906)	43,465			13,297	56,762			43,465 13,297 56,762
Administrative Agencies of the Several School Districts				989,300	989,300			989,300 989,300
All Civil Administrative Agencies of the State	347,947	4,447,265	337,721	1,975,833	7,158,766	219,323		347,947 4,277,942 337,721 1,975,833 6,939,443 219,323

11.015 Subventions Revenues originating with subventions are those items of monetary assistance tendered one unit of government by another in accordance with procedure outlined by statute. Administration of the funds received rests with the several administrative agencies for which the assistance is rendered. Additional information respecting the subventions in effect during the period of this report is given hereafter:

1. Subventions in the interest of State Administrative Agencies

a. The several counties tender moneys to the state for the care of the insane deaf and blind.

2. Subventions in the interest of County Administrative Agencies

a. All receipts from motor vehicle registration, less costs to the state for administration of the law, are tendered the several counties by the state authorities in the interests of county and local roads.

3. Subvention in the interests of City Administrative Agencies

a. The city of Butte receives subventions in the form of revenues deriving from the operation of the motor vehicle registration law as explained herebefore. (Section 11.013)

4. Subventions in the interests of the several school districts

a. State administered revenue
Specific reimbursements for vocational education ($43,220), apportionment of Oil Producers License Tax for high schools and miscellaneous apportionment from the equalization fund.

b. County administered revenue
Forest Reserve apportionment, the proceeds of government land and timber sales allocated to the several counties in the ratio that forest land bears to total.

Detailed information with respect to the amount of moneys tendered in aid of the several units of government is as follows:

Table 76
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS AS A CIRCUMSTANCE OF SUBVENTIONS FOR THE YEAR
Ending June 30, 1936

For Expenditure By -	Revenues Originating by Subventions: Counties General	Motor Vehicle Registration	State Administered	County Admission Forest Reserve Appliçation	Total Revenue
Administrative Agencies of the State	15,622				15,662
Administrative Agencies of the Several Counties		1,079,992			1,079,992
Administrative Agencies of the City of Butte		33,563			33,563
Administrative Agencies of the Several School Districts			262,962	23,258	262,962 23,258
All Civil Administrative Agencies of the State	15,622	1,113,555	262,962	23,258	1,415,397

11.016 Revenues Administered by the State Other than Subventions

A source of revenue for the several school districts deriving from the allocation of state administered revenues and apportionments from the State Public School Equalization Fund is listed herewith as a separate source of income. The revenue total $1,025,492 as shown in Table FS-9-a-8 of the Fiscal Survey tabulation.

11.017 Federal Aids and Grants

Federal Aids and Grants originating usually with the Federal Government as a circumstance of congressional action are those monetary items tendered the state or political sub-divisions in the interest of public works and public welfare. More particular information with reference to this source of revenue is as follows:

1. Funds accruing to the administrative agencies of the State.

a. Grants of the United States Public Works Administration whereby the Federal Government makes a grant or renders aid in the construction of dams, public buildings, schools, etc.

b. Funds advanced in the interest of vocational training and other features of education; also grants whereby assistance is rendered specific industries such as agriculture and mining.

c. Grants in aid of the public welfare such as those directed to the relief of unemployment, etc.

d. Miscellaneous Receipts from other units.

e. Federal Aid rendered the State Highway Department for the construction of the Federal Aid System and the State Secondary System as designated.

2. Funds accruing to the several counties

a. Grants in the interest of highway construction and incidental public welfare.

b. Grants in aid of public welfare, social security, etc.

c. Grants in aid of general government.

3. Funds accruing to the several municipalities:

a. Grants in the interest of highway construction (FERA)

b. Grants in aid of education (FERA)

c. Grants in aid of public welfare (FERA)

d. Grants in aid of general government (FERA)

Detailed information with respect to these several grants and aids is as follows:

TABLE 77
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF FEDERAL AIDS AND GRANTS
For the Year Ending June 30, 1936

For Expenditure By -	Revenues Originating With Federal Aids & Grants For -					From Other Units	Total Revenue from Federal Aids & Grants
	Public Works	Highways	Educetion	Public Welfare	General Government		
Administrative Agencies of the Stete	157,906	5,739,175	446,376	3,458,641		48,297	9,850,395
Administrative Agencies of the Several Counties		17,142		262,101	199,738		478,981
Administrative Agencies of Cities Heving a Population of 1,000 or less		13,721	154	46,892	21,200		81,967
Administrative Agencies of Cities Heving e Populetion of 1,001 to 2,500		1,500	24	87,117	25,313		113,954
Administrative Agencies of Cities Heving e Popu- lation of 2,501 to 5,000			60	43,316	17,796		61,172
Administrative Agencies of Cities Heving a Population of 5,001 to 10,000				64,511	25,072		89,583
Administrative Agencies of Cities Having a Population o. 10,001 25,0				79,986	55,014		135,000
Administrative Agencies of the City of Great Falls					916		916
Administrative Agencies of the City of Butte		119	392	255,584	60,808		316,903
All Civil Administrative Agencies of the Stete	157,906	5,771,657	447,006	4,298,148	405,857	48,297	11,128,871

11.0181 Borrowings, Long Term (Bonded)

Long term debts include all forms of bonded or fixed indebtedness, that is to say, debts incurred whereby the agency or governmental authority in the debt agrees to satisfy the obligation at some future date at a stipulated rate of interest. Additional data with respect to this source of revenue are as follows:

1. Borrowings of the State Administrative Agencies

Highway Debenture Redemption
Educational Bond Series
Tuberculosis Sanitarium Building
Insane Asylum Construction
Eastern Montana Normal Construction
Deaf and Blind School Building
Normal School Construction
Capital Building
Industrial School Construction
A Refunding Issue to Take Up Outstanding Warrants of the State General Fund

2. Borrowings of the Several Counties.

The several counties are indebted as a circumstance of bond issues in the interest of highways, public welfare and services, and general government. These several issues are secured in accord with controls and limits of indebtedness established by statute.

3. Borrowings of the Several Municipalities

Bonded issues similar to those set forth herebefore as borrowings of the several counties.

4. Borrowings of the Several School Districts

Bonded issues in the general interest of education.

More particular data with respect to the several issues of bonds are as follows:

Table 78
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF BORROWINGS (Bonded)
For the Year Ending June 30, 1936

For Expenditure By -	Revenues Originating With Borrowings				Total Revenue
	Highways	Public Welfare	General Government	Education	
Administrative Agencies of the State		100,000		457,000	557,000
Administrative Agencies of the Several Counties	415,318	103,232	6,682		525,232
Administrative Agencies of Cities Having a Population of 1,000 or less	1,761	157,188	8,596		167,545
Administrative Agencies of Cities Having a Population of 1,001 to 2,500			10,724		10,724
Administrative Agencies of Cities Having a Population of 2,501 to 5,000		49,000	7,000		56,000
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	146,844				146,844
Administrative Agencies of Cities Having a Population of 10,001 to 25,000		340,000	131,000		471,000
Administrative Agencies of the Several School Districts				595,200	595,200
All Civil Administrative Agencies of the State	563,923	749,420	164,002	1,052,200	2,529,545

11.0182 Borrowings (Short Term)

Short term loans comprise outstanding warrants from each of several funds at the beginning of the fiscal year. Additional data respecting this source of revenue are as follows:

Table 79

REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF SHORT TERM LOANS
For the Year Ending June 30, 1936

For Expenditure By -	Revenues Originating With Borrowings				Total Revenue
	Highways	Education	Public Welfare	General Government	
Administrative Agencies of the State	456,075	62,899	79,884	1,051	599,909
Administrative Agencies of the Several Counties	28,073		31,562	36,329	95,964
Administrative Agencies of Cities Having a Population of 1,000 or less	1,489		11,588	2,115	15,192
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	268	44	536	3,277	4,125
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	40,753		2,728	790	44,271
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	4,191	244	5,368	6,868	16,671
Administrative Agencies of Cities Having a Population of 10,001 to 25,000				8,638	8,638
Administrative Agencies of the City of Butte	21,041		690	31,329	53,060
All Civil Administrative Agencies of the State	551,890	63,187	132,356	90,397	837,830

11.019 Balance Beginning of Year

Balances on hand at the beginning of the fiscal year constitute a source of revenue as follows for the year of the financial survey.

Table 80
REVENUES ACCRUING TO THE STATE AND ITS POLITICAL SUB-DIVISIONS
AS A CIRCUMSTANCE OF RECEIPT OF BALANCES ON HAND
For Year Ending June 30, 1936

For Expenditure By -	Revenues Originating As Balances On hand	Specifically Committed for Outstanding Debt	Available for Administrative Purposes
Administrative Agencies of the State	6,258,417	1,442,258	4,816,159
Administrative Agencies of the Several Counties	6,291,842	2,076,235	4,215,607
Administrative Agencies of Cities Having a Population of 1,000 or less	356,502	63,183	293,319
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	398,487	155,733	242,754
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	143,291	31,136	112,155
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	349,319	48,911	300,408
Administrative Agencies of Cities Having a Population of 10,001 to 25,000	362,357	41,471	320,886
Administrative Agencies of the City of Great Falls (population 28,431)	497,335	326,911	170,424
Administrative Agencies of the City of Butte (population 38,968)	129,929	74,855	55,074
Administrative Agencies of the Several School Districts	4,494,485	759,604	3,734,881
All Civil Administrative Agencies of the State	19,281,964	5,020,297	14,261,667

These several taxes, imposts, license fees and other revenue when combined present information as follows respecting all revenues for the year ending June 30, 1936.

TABLE 81
RECAPITULATION OF ALL REVENUE RECEIPTS OF THE STATE AND POLITICAL SUB-DIVISIONS THEREOF
For the Year Ending June 30, 1936

For Expenditure By	Original Sources of Revenue										Specific Commitments		Currently Available for Administrative Purposes
	Property Tax	Special Taxes & Imposts	Motor Vehicle Imposts	Other General Revenue	Subventions	Revenues Administered by the State Other Than Subventions	Federal Aids and Grants	Borrowings: Long Term Bonded	Borrowings: Short Term	Balances on Hand	Total Revenue	For Outstanding Debt	For Other Units	
Administrative Agencies of the State	2,516,968	124,013	5,612,828	4,926,182	1/ 15,622		9,850,395	557,000	599,909	6,258,417	30,461,334	829,238 306,339 219,323 1,442,258 2,797,158	1,113,555	1,687,730 124,013 4,192,934 4,706,859 11,022,926 4,816,159 26,550,621
Administrative Agencies of the Several Counties	9,971,122	52,910		237,635	2/ 1,079,952		478,981	525,232	95,964	6,291,842	18,733,678	1,349,634 791 2,076,235 3,426,660		8,621,488 52,119 2,117,804 4,215,607 15,307,018
Administrative Agencies of Cities Having a Population of 1,000 or less	321,353			104,708			81,967	167,545	15,192	356,502	1,047,267	108,886 63,183 172,069		212,467 369,412 293,319 875,198
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	482,304			182,547			113,954	10,724	4,125	398,487	1,192,141	170,528 155,733 326,261		311,776 311,350 242,754 865,880
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	205,778			85,321			61,172	56,000	44,271	143,291	595,833	58,662 31,136 89,798		147,116 246,764 112,155 506,035
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	469,411			224,474			89,583	146,844	16,671	349,319	1,296,302	52,966 48,911 101,877		416,445 477,572 300,408 1,194,425
Administrative Agencies of Cities Having a Population of 10,001 to 25,000	879,424			200,898			135,000	471,000	8,638	362,357	2,057,317	105,409 41,471 146,880		774,015 815,536 320,886 1,910,437
Administrative Agencies of the City of Great Falls (population 28,431)	416,303			150,939			916			497,335	1,065,493	81,492 326,911 408,403		334,811 151,855 170,424 657,090
Administrative Agencies of the City of Butte (population 38,968)	579,265			56,762	3/ 33,563		316,903		53,060	129,929	1,169,482	250,535 74,855 325,390		328,730 460,288 55,074 844,092
Administrative Agencies of the Several School Districts	10,737,479			989,300	4/ 286,220	5/ 1,025,492		595,200		4,494,485	18,128,176	1,870,200 759,604 2,629,804		8,867,279 2,896,212 3,734,881 15,498,372
All Civil Administrative Agencies of the State	26,579,407	176,923	5,612,828	7,158,766								4,877,550 791 306,339 219,323	1,113,555	21,701,857 176,132 4,192,934 6,932,443
	Tax Revenue Receipts 6/			39,527,984	1,415,397	1,025,492	11,128,871	2,529,545	837,830			5,404,003	1,113,555	33,010,366
										19,281,964	75,747,023	5,020,297 10,424,300	1,113,555	16,937,135 14,261,667 64,209,168
	Total Revenue Receipts (Including Subventions, State Administered Revenue and Balance on Hand)										54,024,170	5,404,003	1,113,555	47,506,612

1/ Subvention from counties to state in interest of care of insane, deaf and blind.
2/ Subvention from state to counties in interest of highways and roads.
3/ Subvention from state to Butte in interest of streets.
4/ Subvention from state to school districts in interest of education.
5/ Apportioned by state to several school districts in interest of education.
6/ Includes $1,559 gift or bequest to city of Butte.

11.02 Relation of Revenue for Highways to Other Governmental Revenue

Revenues accruing to the State and the political subdivisions thereof for the construction and maintenance of the several highway systems and such regulatory control of traffic as is embodied in the Highway Patrol Act and the Motor Carrier Act comprise 29.8% of the total general revenue. Further information with respect to the several levies rendered in the interest of highway, street, road and bridge affairs is as follows:

1. Revenues accruing to Administrative Agencies of the State

a. Gasoline License Tax - to the State Highway Fund for construction and maintenance of the Federal Aid System.

b. Motor Vehicle License Tax - to the general road fund of the counties and a small portion to the city of Butte for the construction and maintenance of local roads and streets less cost to the State for collection, postage, license plates, etc.

c. Drivers' License Fees - to the State Highway Patrol Fund for traffic regulation and control on the rural highways of the State.

d. Motor Carriers' Fees - to the Montana Railroad and Public Service Commission for the control and regulation of Motor Carrier operations on the highways of the State.

e. Federal Aids and Grants - in the interest of highway construction on the Federal Aid System and on the County Trunk System.

f. Borrowings - for expenditure on the construction and maintenance of the Federal Aid System.

2. Revenues accruing to Administrative Agencies of the Several Counties

a. Property Taxes - allocation according to levy for construction and maintenance of the rural local roads.

b. Special Taxes - allocation from the Road Tax levies for construction and maintenance of rural local roads.

c. Other General Revenue - allocation from tax deed rentals, undistributed taxes and miscellaneous receipts for construction and maintenance of the rural local roads.

d. Federal Aids and Grants - allocated by the FERA for construction of local roads.

e. Subventions - proceeds of the Motor Vehicle License Tax less costs of collection, license plates, etc. to the State for construction and maintenance on local rural roads.

f. Borrowings - for construction and maintenance of rural roads.

3. Revenues accruing to the Several Municipalities.

a. Property Taxes - allocations in the interest of construction and maintenance of city streets.

b. Other General Revenues - allocations in the interest of construction and maintenance of city streets.

c. Federal Aids and Grants - for construction and maintenance of city streets.

d. Subventions - allocated from receipts of Motor Vehicle License Tax to the city of Butte.

e. Borrowings - allocated to construction and maintenance of city streets.

Additional data respecting revenues and relationships existing between the revenues of the several operative units are as follows:

N.B. The extensions on this tabulation do not check with previous tables for the reason that subventions are credited immediately to the unit for which they were originally destined.

Table 82
SHOWING OPERATING REVENUES FOR EACH OF SEVERAL GOVERNMENTAL FUNCTIONS AND RELATIONSHIPS OBTAINING THEREWITH

For Expenditure By -	Operating Revenues for Highways		Operating Revenues for Education		Operating Revenue for Public Welfare & Services		Operating Revenues for General Government		Total Operating Revenue	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Administrative Agencies of the State	10,694,523	49.0	2,873,835	13.2	4,860,389	22.3	3,372,161	15.5	21,800,908	100.0
Administrative Agencies of the Several Counties	4,425,885	35.7	219,594	.8	3,756,092	30.3	4,001,385	32.2	12,402,956	100.0
Administrative Agencies of Cities Having a Population of 1,000 or less	67,459	9.9	1,397	0.2	537,899	78.9	75,010	11.0	681,765	100.0
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	77,631	9.8	6,629	0.8	550,147	69.4	159,247	20.0	793,654	100.0
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	74,462	16.5	5,656	1.2	295,650	65.2	76,754	17.1	452,542	100.0
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	309,192	32.6	32,775	3.5	401,068	42.3	203,948	21.6	946,983	100.0
Administrative Agencies of Cities Having a Population of 10,001 to 25,000	195,151	11.5	42,335	2.5	1,188,910	70.1	268,564	15.9	1,694,960	100.0
Administrative Agencies of Cities Having a Population of 28,431, Great Falls	109,273	19.3	18,175	3.2	394,844	69.5	45,866	8.0	568,158	100.0
Administrative Agencies of the City of Butte (Population, 30,968)	175,215	16.9	11,734	1.1	520,585	50.1	332,019	31.9	1,039,553	100.0
Administrative Agencies of the Several School Districts			13,633,691	100.0					13,633,691	100.0
All Civil Administrative Agencies of the State	16,128,811	29.9	16,845,821	31.2	12,505,544	23.1	8,534,954	15.8	54,024,170	100.0

Significant data deriving from the tabulations are as follows:

1. Highway revenues comprise **29.9%** of all revenues for the year studied.

2. Revenues for educational functions make up the largest single fund.

3. From this table and previous tables we find that specific levies for highway purposes comprise **22.6%** of the total tax revenue.

11.03 Expenditure by Purpose — All these funds are destined for expenditure in the interest of four operative functions, these being highways, education, public welfare and service, and general government. Moneys are expended in the interest of these several functions, either directly or for debt service. Additional information respecting disbursements by the several governmental units is as follows:

Table 83
DISBURSEMENTS OF THE STATE AND POLITICAL SUB DIVISIONS THEREOF
For the Year Ending June 30, 1936

Disbursed by -	Disbursements														Total Disbursements				Grand Total
	Highways				Education				Public Welfare				General Government						
	Direct		Debt Service		Direct		Debt Service		Direct		Debt Service		Direct		Debt Service		Direct		Debt Service		
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount
Authorized agencies of the State	9,516,4[illegible]	40.6	660,993	2.8	1,571,259	6.0	1,981,076	6.8	5,426,487	23.3	191,161	0.8	2,342,700	12.7	1,108,017	4.8	19,756,891	84.8	3,541,247	15.2	23,300,138
Authorized agencies of the Several Counties	2,857,628	23.5	1,571,445	13.0	218,244	1.8			3,257,716	26.9	461,078	3.8	3,127,395	25.6	632,071	5.2	9,460,983	78.0	2,664,594	22.0	12,1[illegible],577
Authorized agencies of cities having a population of -																					
1,000 or less	58,360	8.1	8,667	1.2	1,431	0.2			305,288	53.6	165,661	23.0	74,716	10.4	25,127	3.5	519,795	72.3	199,455	27.7	719,250
1,001 to 2,500	68,856	10.3	13,457	1.6	6,996	0.8	13		477,327	55.7	103,820	12.0	120,334	14.0	47,856	5.6	693,513	80.0	165,146	19.2	858,659
2,501 to 5,000	92,398	21.1	22,552	5.1	5,545	1.3	18		212,600	48.4	40,850	9.3	44,935	10.2	20,153	4.6	355,478	81.0	83,573	19.0	439,051
5,001 to 10,000	270,895	27.9	111,934	11.5	30,308	3.1	67		349,245	35.9	21,723	2.2	129,038	13.2	59,478	6.2	779,466	80.1	193,202	19.9	972,688
10,001 to 25,000	180,813	12.0	1,154	0.1	37,239	2.5	36		652,483	43.4	394,527	26.2	164,541	11.0	71,707	4.8	1,035,386	68.9	467,424	31.1	1,502,810
Great Falls	77,376	14.5	37,388	7.0	16,543	3.1			262,712	49.3	96,682	18.2	34,504	6.6	7,223	1.3	391,135	73.5	141,293	26.5	532,428
Butte	83,369	8.7	12,250	1.3	11,445	1.2	340		522,845	54.3			191,715	19.8	141,750	14.8	809,374	84.0	154,340	16.0	963,714
Authorized agencies of the Several School Dist.					11,054,584	85.5	1,870,200	14.5									11,054,564	85.5	1,870,200	14.5	12,924,784
All authorized agencies of the State	13,226,140	24.3	2,439,840	4.5	13,253,604	24.4	3,451,750	6.5	11,548,703	21.2	1,475,502	2.7	6,830,178	12.6	2,113,362	3.8	44,858,629	82.5	9,480,474	17.5	54,339,099
Unit Distribution	13,226,140	84.5	2,439,840	15.5	13,253,604	79.4	3,451,750	20.6	11,548,703	88.6	1,475,502	11.4	6,830,178	76.5	2,113,362	23.5	44,858,629	82.5	9,480,474	17.5	54,339,099
Unit Totals	15,665,980			28.8	16,705,354			30.9	13,024,205			23.9	8,943,560			16.4	54,339,099			100.0	

Significant data deriving from the tabulation are as follows:

1. Twenty-eight and eight-tenths of all expenditures are made in the interest of highways, including construction and maintenance, operations, interest - payment, and debt retirements.

2. Eighty-four and five-tenths percent of all highway expenditure are devoted to operating costs and the balance to debt retirement.

3. The greatest single fund expenditure was made in the interest of public education (30.9%) during the year studied; the next greatest expenditure was that devoted to highways followed by funds expended in the interest of public welfare and service and general government in the order named.

11.031--Debt Service Present and Future

Debt service requirements are not susceptible to a precise analysis for the reason that changing economic conditions influence the borrowing practice of the several administrative agencies in charge of the expenditure of the public funds. As an example, we might cite favorable economic conditions in effect during 1936, as a factor in the payment of delinquent taxes, a large part of which went to retire outstanding obligations. Refunding issues to take advantage of low interest rates are another contemporary phase of finance to better the fiscal set-up. As a consequence of these conditions the obligations of the several units are undergoing re-adjustment to the end that bonds and warrants outstanding are decreasing. It is the belief, however of this department that obligations will continue at about the same ratio with respect to revenues as was apparent at the close of the fiscal year of 1936. In other words, funds will be committed or destined for debt service in the same measure of percentage as in 1936. Bond issues of the future for highway purposes will very probably not be repaid out of revenues deriving from property taxes; it is almost a certainity that these obligations will be retired from specific levies on highway users (motor vehicle imposts). As to bonds outstanding as of June 30, 1936, we have data as follows;

TABLE 34

Debt Incurred By -	Obligations Against														Total
	Highway Funds		Education Funds		Public Welfare & Service		General Government Funds		Refunded Obligations		Quasi-Public Funds		All Administrative Funds		
	Bonded	Temporary	Bonded	Temporary	Bonded	Temporary	Bonded	Temporary	Bonded	Temporary	Bonded	Temporary	Bonded	Temporary	
Administrative Agencies of the State	2,956,031	480,075	[illegible]	26,837	1,031,323	80,444	3,640,068	5,650			825,000		10,976,976	570,428	11,849,452
Administrative Agencies of the Several Counties	1,391,167	361,508	[illegible]	3,477	1,746,767	246,167	749,332	263,109	682,681				7,570,017	477,901	6,447,278
Administrative Agencies of Cities Having a Population of 1,000 or less	69,728	2,900			1,100,305	33,954	37,823	45,198					1,207,936	81,706	1,289,644
Administrative Agencies of Cities Having a Population of 1,001 to 2,500	109,998	4,110			1,271,365	17,169	129,617	66,397					1,511,380	87,976	1,599,056
Administrative Agencies of Cities Having a Population of 2,501 to 5,000	38,009	6,991		2	357,487	14,573	103,491	20,810					518,507	42,376	561,365
Administrative Agencies of Cities Having a Population of 5,001 to 10,000	562,105	14,663	1,300	543	174,[illegible]	24,516	247,727	17,016					1,[illegible]6,000	56,678	1,[illegible],078
Administrative Agencies of Cities Having a Population of 10,001 to 25,000	99,072	1,202		685	497,614	206,947	309,821	1,400					906,507	290,434	1,196,941
Administrative Agencies of the City of Great Falls (Population 26,431)	30,681	143,101		1,166	746,348	471,156	70,645	19,594					849,274	635,017	1,484,291
Administrative Agencies of the City of Butte (Population 30,963)	29,823	21,550		2,013		6,150	1,259,998	31,066					1,489,821	61,579	1,551,400
Administrative Agencies of the Several School Districts				7,696,358	145,574								7,696,358	145,574	7,[illegible],932
All Civil Administrative Agencies of the State	5,863,114	1,017,596	10,251,202	151,897	6,924,097	1,180,698	6,526,702	471,040	682,681		825,000		34,074,956	2,851,231	36,926,187

For purposes of allocating funds, particularly for highways, this office believes the following tabulation to be just and equitable as regards future debt service requirements:

1. State Highway Funds - 15% of total revenue, not to exceed $450,000 annually.

2. County Road Funds - 35% of total revenue, not to exceed $1,600,000 annually.

3. City Street Funds - 20% of total revenue, not to exceed $200,000 annually.

11.04 Specific Revenue for Highways

Each of the several levies or tax revenue receipts, federal aids and borrowings effected in the interest of highway, road and street construction and maintenance are predestined for expenditure on some specific road system or section thereof. Further information with respect to the origin of funds and the flow of such funds is as follows:

Table 85A

REVENUES FOR HIGHWAYS DERIVING FROM GASOLINE LICENSE TAX

For the Year Ending June 30, 1936

Paid by Owners Resident in -	Tax Cost Classification	Passenger Cars	Trucks & Buses	All Motor Vehicles
Unincorporated Areas	Total Collections	1,222,672	774,856	1,997,528
	Per Vehicle	19.28	28.20	21.98
	Per Vehicle Mile	0.0029	0.0044	0.0033
	Per Capita	4.33	2.74	7.07
Incorporated areas having a population of 1,000 or less	Total Collections	144,821	40,311	185,132
	Per Vehicle	17.73	26.52	19.11
	Per Vehicle Mile	0.0028	0.0042	0.0030
	Per Capita	3.89	1.08	4.97
Incorporated areas having a population of 1,001 to 2,500	Total Collections	166,718	62,845	229,563
	Per Vehicle	18.55	36.99	21.48
	Per Vehicle Mile	0.0028	0.0047	0.0034
	Per Capita	4.08	1.54	5.62
Incorporated areas having a population of 2,501 to 5,000	Total Collections	75,748	20,323	96,071
	Per Vehicle	17.96	30.29	19.65
	Per Vehicle Mile	0.0028	0.0043	0.0031
	Per Capita	4.10	1.10	5.20
Incorporated areas having a population of 5,001 to 10,000	Total Collections	181,360	73,761	255,121
	Per Vehicle	19.65	45.59	23.52
	Per Vehicle Mile	0.0028	0.0053	0.0033
	Per Capita	4.34	1.77	6.11
Incorporated areas having a population of 10,001 to 25,000	Total Collections	333,685	159,129	492,814
	Per Vehicle	19.87	55.87	25.09
	Per Vehicle Mile	0.0029	0.0059	0.0035
	Per Capita	5.46	2.60	8.06
City of Great Falls (population 28,431)	Total Collections	187,630	51,228	238,858
	Per Vehicle	23.75	33.22	25.30
	Per Vehicle Mile	0.0029	0.0046	0.0032
	Per Capita	6.60	1.80	8.40
City of Butte (population 38,968)	Total Collections	177,218	71,653	248,871
	Per Vehicle	22.27	56.55	26.98
	Per Vehicle Mile	0.0030	0.0063	0.0036
	Per Capita	4.45	1.80	6.25
State of Montana	Total Collections	2,489,852	1,254,106	3,743,958
	Per Vehicle	19.66	32.45	22.65
	Per Vehicle Mile	0.0029	0.0047	0.0033
	Per Capita	4.53	2.28	6.81

Table 85A (Continued)

Paid by Owners Resident in -	Tax Cost Classification	Passenger Cars	Trucks & Buses	All Motor Vehicles
Other States	Total Collections Per Vehicle Per Vehicle Mile Per Capita	407,354	41,371	448,725
Total Revenue	Total Collections Per Vehicle Per Vehicle Mile Per Capita	2,897,206	1,295,477	4,192,683

Table 85B
REVENUES FOR LOCAL ROADS AND STREETS DERIVING FROM
MOTOR VEHICLE LICENSE TAX
For the Year Ending June 30, 1936

Paid by Owners Resident in -	Tax Cost Classification	Passenger Cars	Trucks & Buses	All Motor Vehicles
Unincorporated Areas	Total Collections	398,202	237,895	636,097
	Per Vehicle	6.2800	8.6573	6.9988
	Per Vehicle Mile	0.0009	0.0014	0.0011
	Per Capita	1.4106	0.8428	2.2534
Incorporated areas having a population of 1,000 or less	Total Collections	54,644	14,091	68,735
	Per Vehicle	6.6900	9.2704	7.0949
	Per Vehicle Mile	0.0011	0.0015	0.0011
	Per Capita	1.4696	0.3790	1.8486
Incorporated areas having a population of 1,001 to 2,500	Total Collections	54,809	15,894	70,703
	Per Vehicle	6.1000	9.3549	6.6177
	Per Vehicle Mile	0.0009	0.0012	0.0010
	Per Capita	1.3400	0.3886	1.7286
Incorporated areas Having a population of 2,501 to 5,000	Total Collections	27,410	5,846	33,256
	Per Vehicle	6.4999	8.7124	6.8036
	Per Vehicle Mile	0.0010	0.0012	0.0011
	Per Capita	1.4809	0.3158	1.7967
Incorporated areas having a population of 5,001 to 10,000	Total Collections	62,935	18,404	81,339
	Per Vehicle	6.8200	11.3745	7.4994
	Per Vehicle Mile	0.0010	0.0013	0.0010
	Per Capita	1.5071	0.4407	1.9478

Table 85B (Continued)

Paid by Owners Resident in -	Tax Cost Classification	Passenger Cars	Trucks & Buses	All Motor Vehicles
Incorporated areas having a population of 10,001 to 25,000	Total Collections	119,763	34,442	154,205
	Per Vehicle	7.1300	12.0857	7.8496
	Per Vehicle Mile	0.0010	0.0013	0.0011
	Per Capita	1.9599	0.5636	2.5235
Incorporated areas having a population of 28,431, Great Falls	Total Collections	49,691	15,809	65,500
	Per Vehicle	6.2900	10.2523	7.1452
	Per Vehicle Mile	0.0008	0.0014	0.0009
	Per Capita	1.7478	0.5560	2.3038
Incorporated areas having a population of 38,968, Butte	Total Collections	55,700	15,925	71,624
	Per Vehicle	6.9992	12.5691	7.7650
	Per Vehicle Mile	0.0010	0.0014	0.0010
	Per Capita	1.4294	0.4087	1.8381
State of Montana	Total Collections	823,154	358,306	1,181,460
	Per Vehicle	6.4989	9.2720	7.1472
	Per Vehicle Mile	0.0010	0.0013	0.0010
	Per Capita	1.4990	0.6525	2.1515
Other States	Total Collections	7,675	50,466	58,141
	Per Vehicle	6.5098		
	Per Vehicle Mile			
	Per Capita			
Total Revenue	Total Collections	830,829	408,772	1,239,601
	Per Vehicle	6.4990		
	Per Vehicle Mile			
	Per Capita			

Table 85C
REVENUES FOR LOCAL ROADS AND STREETS DERIVING FROM THE GENERAL PROPERTY TAX
For the Year Ending June 30, 1936

Paid by Owners Resident in -	Tax Cost Classification	For County Roads	For City Streets & Alleys	Total Road & Street Revenue
Unincorporated Areas	Total Collections	2,668,360		2,668,360
	Per Vehicle	29.36		29.36
	Per Vehicle Mile	0.0045		0.0045
	Per Capita	9.45		9.45

Table 85C (Continued)

Paid by Owners Resident in -	Tax Cost Classification	For County Roads	For City Streets & Alleys	Total Road & Street Revenue
Incorporated areas having a population of 1,000 or less	Total Collections	12,667	45,352	58,019
	Per Vehicle	1.31	4.68	5.99
	Per Vehicle Mile	0.0002	0.0007	0.0009
	Per Capita	0.34	1.22	1.56
Incorporated areas Having a population of 1,001 to 2,500	Total Collections	14,995	61,616	76,611
	Per Vehicle	1.40	5.77	7.17
	Per Vehicle Mile	0.0002	0.0009	0.0011
	Per Capita	0.37	1.50	1.87
Incorporated areas having a population of 2,501 to 5,000	Total Collections	7,524	29,674	37,698
	Per Vehicle	1.54	6.07	7.61
	Per Vehicle Mile	0.0002	0.0009	0.0011
	Per Capita	0.41	1.60	2.01
Incorporated areas having a population of 5,001 to 10,000	Total Collections	23,114	142,426	165,540
	Per Vehicle	2.13	13.13	15.26
	Per Vehicle Mile	0.0003	0.0018	0.0021
	Per Capita	0.65	3.41	4.06
Incorporated areas having a population of 10,001 to 25,000	Total Collections	38,164	181,419	219,583
	Per Vehicle	1.94	9.23	11.17
	Per Vehicle Mile	0.0003	0.0013	0.0016
	Per Capita	0.63	2.97	3.60
Incorporated areas having a population of 28,431 Great Falls	Total Collections	19,109	82,186	101,295
	Per Vehicle	2.02	8.70	10.72
	Per Vehicle Mile	0.0003	0.0011	0.0014
	Per Capita	0.67	2.89	3.56
Incorporated areas having a population of 38,968, Butte	Total Collections	20,733	110,146	130,879
	Per Vehicle	2.25	11.94	14.19
	Per Vehicle Mile	0.0003	0.0016	0.0019
	Per Capita	0.53	2.82	3.35
State of Montana	Total Collections	2,804,666	652,819	3,457,485
	Per Vehicle	16.97	3.95	20.92
	Per Vehicle Mile	0.0025	0.0006	0.0031
	Per Capita	5.11	1.19	6.30

Table 85D

REVENUES FOR LOCAL ROADS AND STREETS DERIVING FROM OTHER GENERAL REVENUE RECEIPTS

For the Year Ending June 30, 1936

Paid by Owners Resident in -	Tax Cost Classification	For County Roads	For City Streets & Alleys	Total Road & Street Revenue
Unincorporated Areas	Total Collections	60,376		60,376
	Per Vehicle	0.66		0.66
	Per Vehicle Mile	0.0001		0.0001
	Per Capita	0.21		0.21
Incorporated areas having a population of 1,000 or less	Total Collections	1,888	5,136	7,024
	Per Vehicle	0.19	0.53	0.72
	Per Vehicle Mile	0.00003	0.00008	0.0001
	Per Capita	0.05	0.14	0.19
Incorporated areas having a population of 1,001 to 2,500	Total Collections	2,235	14,247	16,482
	Per Vehicle	0.21	1.33	1.54
	Per Vehicle Mile	0.00003	0.0002	0.0002
	Per Capita	0.05	0.35	0.40
Incorporated areas having a population of 2,501 to 5,000	Total Collections	1,122	4,055	5,177
	Per Vehicle	0.23	0.83	1.06
	Per Vehicle Mile	0.00004	0.0001	0.0002
	Per Capita	0.06	0.22	0.28
Incorporated areas having a population of 5,001 to 10,000	Total Collections	3,446	15,731	19,177
	Per Vehicle	0.32	1.45	1.77
	Per Vehicle Mile	0.00004	0.0002	0.0002
	Per Capita	0.08	0.38	0.46
Incorporated areas having a population of 10,001 to 25,000	Total Collections	5,689	13,732	19,421
	Per Vehicle	0.29	0.70	0.99
	Per Vehicle Mile	0.00004	0.0001	0.0001
	Per Capita	0.09	0.22	0.31
Incorporated areas having a population of 28,431 Great Falls	Total Collections	2,848	27,087	29,935
	Per Vehicle	0.30	2.87	3.17
	Per Vehicle Mile	0.00004	0.0004	0.0004
	Per Capita	0.10	0.95	1.05
Incorporated areas having a population of 38,968, Butte	Total Collections	3,091	10,346	13,437
	Per Vehicle	0.34	1.12	1.46
	Per Vehicle Mile	0.00004	0.0001	0.0002
	Per Capita	0.08	0.27	0.35
State of Montana	Total Collections	80,695	90,334	171,029
	Per Vehicle	0.49	0.55	1.04
	Per Vehicle Mile	0.0001	0.0001	0.0002
	Per Capita	0.15	0.16	0.31

Table 85E

REVENUES FOR TRAFFIC CONTROL AND TRANSPORTATION REGULATION DERIVING FROM THE DRIVER'S LICENSE AND MOTOR CARRIER FEES.

For the Year Ending June 30, 1936

Paid by Owners Resident in -	Tax Cost Classification	Drivers' Licenses	Motor Carrier's Fees	Total Revenue
Unincorporated Areas	Total Collections	81,013	23,606	104,619
	Per Vehicle	0.89	0.26	1.15
	Per Vehicle Mile	0.0001	0.00004	0.0002
	Per Capita	0.29	0.08	0.37
Incorporated areas having a population of 1,000 or less	Total Collections	8,636	1,306	9,942
	Per Vehicle	0.89	0.13	1.02
	Per Vehicle Mile	0.0001	0.00002	0.0002
	Per Capita	0.23	0.04	0.27
Incorporated areas having a population of 1,001 to 2,500	Total Collections	9,523	1,460	10,983
	Per Vehicle	0.89	0.14	1.03
	Per Vehicle Mile	0.0001	0.00002	0.0002
	Per Capita	0.23	0.04	0.27
Incorporated areas having a population of 2,501 to 5,000	Total Collections	4,357	576	4,933
	Per Vehicle	0.89	0.12	1.01
	Per Vehicle Mile	0.0001	0.00002	0.0002
	Per Capita	0.24	0.03	0.27
Incorporated areas having a population of 5,001 to 10,000	Total Collections	9,668	1,390	11,058
	Per Vehicle	0.89	0.13	1.02
	Per Vehicle Mile	0.0001	0.00002	0.0001
	Per Capita	0.23	0.03	0.26
Incorporated areas having a population of 10,001 to 25,000	Total Collections	17,511	2,446	19,957
	Per Vehicle	0.89	0.12	1.01
	Per Vehicle Mile	0.0001	0.00002	0.0001
	Per Capita	0.29	0.04	0.33
Incorporated areas having a population of 28,431 Great Falls	Total Collections	8,416	1,326	9,742
	Per Vehicle	0.89	0.14	1.03
	Per Vehicle Mile	0.0001	0.00002	0.0001
	Per Capita	0.30	0.05	0.35
Incorporated areas having a population of 38,968, Butte	Total Collections	8,222	1,088	9,310
	Per Vehicle	0.89	0.12	1.01
	Per Vehicle Mile	0.0001	0.00002	0.0001
	Per Capita	0.21	0.03	0.24
State of Montana	Total Collections	147,346	33,198	180,544
	Per Vehicle	0.89	0.20	1.09
	Per Vehicle Mile	0.0001	0.00003	0.00015
	Per Capita	0.27	0.06	0.33

TABLE 85F
SHOWING TOTAL HIGHWAY TAX REVENUES
For the Year Ending June 30, 1936.

Paid by Owners Resident in -	Tax Cost Classification	For Primary Roads	For County & Local Roads	For Streets & Alleys	Total
Unincorporated Areas	Total Collections	2,090,456	3,375,924	600	5,466,980
	Per Vehicle	23.00	37.14	0.01	60.15
	Per Vehicle Mile	0.0035	0.0057		0.0092
	Per Capita	7.41	11.96		19.37
Incorporated areas having a population of 1,000 or less	Total Collections	194,656	83,695	50,501	328,852
	Per Vehicle	20.09	8.64	5.21	33.94
	Per Vehicle Mile	0.0032	0.0013	0.0008	0.0053
	Per Capita	5.24	2.25	1.36	8.85
Incorporated areas having a population of 1,001 to 2,500	Total Collections	240,098	88,193	76,051	404,342
	Per Vehicle	22.47	8.25	7.12	37.84
	Per Vehicle Mile	0.0033	0.0012	0.0011	0.0056
	Per Capita	5.87	2.16	1.86	9.89
Incorporated areas having a population of 2,501 to 5,000	Total Collections	100,848	41,979	33,808	176,635
	Per Vehicle	20.63	8.59	6.92	36.14
	Per Vehicle Mile	0.0032	0.0013	0.0011	0.0056
	Per Capita	5.45	2.27	1.83	9.55
Incorporated areas having a population of 5,001 to 10,000	Total Collections	265,740	108,097	158,398	532,235
	Per Vehicle	24.50	9.97	14.60	49.07
	Per Vehicle Mile	0.0034	0.0014	0.0020	0.0068
	Per Capita	6.36	2.59	3.79	12.74
Incorporated areas having a population of 10,001 to 25,000	Total Collections	511,833	198,304	195,843	905,980
	Per Vehicle	26.05	10.04	9.97	46.06
	Per Vehicle Mile	0.0036	0.0014	0.0014	0.0064
	Per Capita	8.38	3.23	3.20	14.81
Incorporated areas having a population of 28,431, Great Falls	Total Collections	247,904	87,537	109,889	445,330
	Per Vehicle	26.26	9.27	11.64	47.17
	Per Vehicle Mile	0.0033	0.0012	0.0014	0.0059
	Per Capita	8.72	3.08	3.86	15.66
Incorporated areas having a population of 38,968, Butte	Total Collections	257,701	59,820	156,601	474,122
	Per Vehicle	27.94	6.48	16.98	51.40
	Per Vehicle Mile	0.0037	0.0008	0.0023	0.0068
	Per Capita	6.61	1.54	4.02	12.17
State of Montana	Total Collections	3,909,236	4,043,549	781,691	8,734,476
	Per Vehicle	23.65	24.46	4.73	52.84
	Per Vehicle Mile	0.0035	0.0036	0.0007	0.0078
	Per Capita	7.12	7.36	1.42	15.90
In Other States	Total Collections	448,725	58,141		506,866
	Per Vehicle				
	Per Vehicle Mile				
	Per Capita				

TABLE 85F (Continued)

Paid by Owners Resident in -	Tax Cost Classification	For Primary Roads	For County & Local Roads	For Streets & Alleys	Total
Total Revenue	Total Collections Per Vehicle Per Vehicle Mile Per Capita	4,357,961	4,101,690	781,691	9,241,342

TABLE 85G
REVENUES FOR HIGHWAYS DERIVING FROM FEDERAL AIDS
For the Year Ending June 30, 1936

Grants in Aid for Residents of -	Distribution	For Primary Highways	For County Roads	For City Streets	Total Grant
Unincorporated Areas	Federal Aid	2,950,199	8,812		2,959,011
	Per Capita	10.45	0.03		10.48
	Per Vehicle	32.46	0.10		32.56
	Per Vehicle Mile	0.0049	0.0001		0.0050
Incorporated areas having a population of 1,000 or less	Federal Aid	388,597	1,161	13,721	403,479
	Per Capita	10.45	0.03	0.37	10.85
	Per Vehicle	40.11	0.12	1.42	41.65
	Per Vehicle Mile	0.0064		0.0002	0.0066
Incorporated areas having a population of 1,001 to 2,500	Federal Aid	427,475	1,277	1,500	430,252
	Per Capita	10.45	0.03	0.04	10.52
	Per Vehicle	40.01	0.12	0.14	40.27
	Per Vehicle Mile	0.0059			0.0059
Incorporated areas having a population of 2,501 to 5,000	Federal Aid	193,441	578		194,019
	Per Capita	10.45	0.03		10.48
	Per Vehicle	39.57	0.12		39.69
	Per Vehicle Mile	0.0061			0.0061
Incorporated areas having a population of 5,001 to 10,000	Federal Aid	436,432	1,304		437,736
	Per Capita	10.45	0.03		10.48
	Per Vehicle	40.24	0.12		40.36
	Per Vehicle Mile	0.0056			0.0056
Incorporated areas having a population of 10,001 to 25,000	Federal Aid	638,631	1,907		640,538
	Per Capita	10.45	0.03		10.48
	Per Vehicle	32.51	0.10		32.61
	Per Vehicle Mile	0.0045			0.0045

TABLE 85G (Continued)

Grants in Aid For Residents of -	Distribution	For Primary Highways	For County Roads	For City Streets	Total Grant
Incorporated areas having a population of 28,431, Great Falls	Federal Aid	297,138	888		298,026
	Per Capita	10.45	0.03		10.48
	Per Vehicle	31.47	0.09		31.56
	Per Vehicle Mile	0.0039			0.0039
Incorporated Areas having a population of 38,968, Butte	Federal Aid	407,262	1,215	119	408,596
	Per Capita	10.45	0.03	0.003	10.51
	Per Vehicle	44.15	0.13	0.01	44.29
	Per Vehicle Mile	0.0059			0.0059
State of Montana	Federal Aid	5,739,175	17,142	15,340	5,771,657
	Per Capita	10.45	0.03	0.03	10.51
	Per Vehicle	34.72	0.10	0.09	34.91
	Per Vehicle Mile	0.0051			0.0051

TABLE 85H
REVENUES ORIGINATING WITH BORROWINGS FOR
the Year Ending June 30, 1936

Borrowings by Residents of -	Distribution	For Primary Highways	For County Roads	For City Streets	Total Borrowings
Unincorporated Areas	Total	234,443	227,923		462,366
	Per Capita	0.83	0.81		1.64
	Per Vehicle	2.58	2.51		5.09
	Per Vehicle Mile	0.0004	0.0004		0.0008
Incorporated areas having a population of 1,000 or less	Total	30,881	30,022	3,250	64,153
	Per Capita	0.83	0.81	0.09	1.73
	Per Vehicle	3.19	3.10	0.34	6.63
	Per Vehicle Mile	0.0005	0.0005	0.0001	0.0011
Incorporated areas having a population of 1,001 to 2,500	Total	33,970	33,025	268	67,263
	Per Capita	0.83	0.81	0.01	1.65
	Per Vehicle	3.18	3.09	0.02	6.29
	Per Vehicle Mile	0.0005	0.0004		0.0009
Incorporated areas having a population of 2,501 to 5,000	Total	15,372	14,945	40,753	71,070
	Per Capita	0.83	0.81	2.20	3.84
	Per Vehicle	3.14	3.06	8.34	14.54
	Per Vehicle Mile	0.0005	0.0004	0.0013	0.0022
Incorporated areas having a population of 5,001 to 10,000	Total	34,682	33,717	151,035	219,434
	Per Capita	0.83	0.81	3.62	5.26
	Per Vehicle	3.20	3.11	13.92	20.23
	Per Vehicle Mile	0.0004	0.0004	0.0019	0.0027
Incorporated areas having a population of 10,001 to 25,000	Total	50,750	49,339		100,089
	Per Capita	0.83	0.81		1.64
	Per Vehicle	2.58	2.51		5.09
	Per Vehicle Mile	0.0004	0.0003		0.0007
Incorporated areas having a population of 28,431,Great Falls	Total	23,613	22,956		46,569
	Per Capita	0.83	0.81		1.64
	Per Vehicle	2.50	2.43		4.93
	Per Vehicle Mile	0.0003	0.0003		0.0006
Incorporated areas having a population of 38,968,Butte	Total	32,364	31,464	21,041	84,869
	Per Capita	0.83	0.81	0.54	2.18
	Per Vehicle	3.51	3.41	2.28	9.20
	Per Vehicle Mile	0.0005	0.0004	0.0003	0.0012
State of Montana	Total	456,075	443,391	216,347	1,115,813
	Per Capita	0.83	0.81	0.39	2.03
	Per Vehicle	2.76	2.68	1.31	6.75
	Per Vehicle Mile	0.0004	0.0004	0.0002	0.0010

TABLE 85I
TOTAL REVENUES FOR HIGHWAYS ROADS AND STREETS
For the Year Ending June 30, 1936

Revenues Originating With Residents of -	Distribution	For Primary Highways	For County Roads	For City Streets	Total Revenue
Unincorporated Areas	Total Collections	5,275,098	3,612,659	600	8,888,357
	Per Capita	18.69	12.80		31.49
	Per Vehicle	58.04	39.75	0.01	97.80
	Per Vehicle Mile	0.0088	0.0061		0.0149
Incorporated areas having a population of 1,000 or less	Total Collections	614,134	114,878	67,472	796,484
	Per Capita	16.52	3.09	1.81	21.42
	Per Vehicle	63.39	11.85	6.96	82.20
	Per Vehicle Mile	0.0100	0.0018	0.0011	0.0129
Incorporated areas having a population of 1,001 to 2,500	Total Collections	701,543	122,495	77,819	901,857
	Per Capita	17.15	3.00	1.90	22.05
	Per Vehicle	65.66	11.46	7.28	84.40
	Per Vehicle Mile	0.0097	0.0017	0.0011	0.0125
Incorporated areas having a population of 2,501 to 5,000	Total Collections	309,661	57,502	74,561	441,724
	Per Capita	16.73	3.11	4.03	23.87
	Per Vehicle	63.35	11.76	15.25	90.36
	Per Vehicle Mile	0.0098	0.0018	0.0024	0.0140
Incorporated areas having a population of 5,001 to 10,000	Total Collections	736,854	143,118	309,433	1,189,405
	Per Capita	17.65	3.43	7.41	28.49
	Per Vehicle	67.94	13.20	28.53	109.67
	Per Vehicle Mile	0.0094	0.0017	0.0040	0.0151
Incorporated areas having a population of 10,001 to 25,000	Total Collections	1,201,214	249,550	195,843	1,646,607
	Per Capita	19.66	4.09	3.20	26.95
	Per Vehicle	61.15	12.71	9.97	83.83
	Per Vehicle Mile	0.0085	0.0018	0.0014	0.0117
Incorporated areas having a population of 28,431,Great Falls	Total Collections	568,655	111,381	109,889	789,925
	Per Capita	20.00	3.92	3.87	27.79
	Per Vehicle	60.23	11.80	11.64	83.67
	Per Vehicle Mile	0.0092	0.0015	0.0014	0.0121
Incorporated areas having a population of 38,968,Butte	Total Collections	697,327	92,499	177,761	967,587
	Per Capita	17.89	2.83	4.56	25.28
	Per Vehicle	75.60	11.97	19.27	106.84
	Per Vehicle Mile	0.0101	0.0016	0.0026	0.0143
State of Montana	Total Collections	10,104,486	4,504,082	1,013,378	15,621,946
	Per Capita	18.40	8.20	1.85	28.45
	Per Vehicle	61.13	27.25	6.13	94.51
	Per Vehicle Mile	0.0090	0.0040	0.0010	0.0140

TABLE 851 (Continued)

Revenues Originating With Residents of -	Distribution	For Primary Highways	For County Roads	For City Streets	Total Revenue
Out of State Owners	Total Collections Per Capita Per Vehicle Per Vehicle Mile	448,725	58,141		506,866
All Owners	Total Collections Per Capita Per Vehicle Per Vehicle Mile	10,553,211	4,562,223	1,013,378	16,128,812

Significant data deriving from these and previous tables are as follows:

1. The Primary System
   a. Of the total revenue, 65.4% is destined for expenditure on the Primary System.
   b. Of the tax revenue receipts, 47.2% is destined for expenditure on the Primary System, of which 10.3% is furnished by out of state owners.

2. County Roads
   a. Of the total receipts, 28.3% is destined for expenditure on the County Road System.
   b. Of the total tax revenue receipts, 44.4% is destined for expenditure on the County Road System, of which 1.4% is furnished by out of state owners.

3. City Streets
   a. Of the total receipts, 6.3% is destined for expenditure on the city streets of the several municipalities.
   b. Of the total tax revenue receipts, 8.4% is destined for expenditure on the city streets of the several municipalities.

11.05 **Imposts Specifically Levied on Highway Users** Imposts discussed heretofore comprehend highway finance in whole. If, for the sake of continued analysis, we say that highways, roads and streets are of value solely as a medium of highway transport and ignore for the moment such considerations as community welfare, the enhancement of property values, etc. we find that revenues deriving from imposts levied on road users are of prime interest. These revenue returns originate with those who use the roads, and road use in terms of vehicle mileage provides a basis for the predication of benefit factors for each of the several systems extant. Imposts specifically levied on road users are as follows:

1. The Gasoline License Tax
2. The Motor Vehicle License Tax
3. The Driver's License
4. Motor Carrier's Fees

These several taxes comprise, for the year studied, 34.7% of the total highway road and street revenue and 60.7% of the total tax revenue receipts. In other words presuming the system to be solvent and road program to be stable and well advised, road users benefits make up but a third (34.7%) of the total value of the several systems, the balance being made up out of funds directed in the interest of community state and national welfare. With the exception of the funds originating with the Motor Carrier's Fees, all the revenues deriving from these several imposts were expended in the interest of highway construction, maintenance and traffic control.

11.06--Highway Expenditures

Each of the several road funds are expended on the construction and maintenance of some certain road system as per the tabulation following:

Gas Tax - For expenditure on the Primary System

Motor Vehicle License Tax - For expenditure on local roads and streets of the city of Butte.

General Property Tax - For expenditure on local roads and streets.

Other General revenue- For expenditure on local roads and streets.

Driver's License - For maintaining the State Highway Patrol. (On the Primary System).

Motor Carrier's Fees - For the administrative functions of the Montana Railroad and Public Service Commission.

Gas tax and motor vehicle license tax revenues are augmented by contribution of $448,725, and $58,141 respectively from out-of-state owners.

A tabulation of highway road and street expenditures for the benefit of the residents of the state is as follows:

N.B. The expenditures for the benefit of the several population groups are devised to show allocations consistent with the findings of the Road Use Survey. Average tax revenue returns are based on a tax cost per vehicle mile, that is to say, a toll per mile equivalent in value to the total tax revenue from all sources.

TABLE 06
HIGHWAY, ROAD AND STREET EXPENDITURES OF TAX REVENUE RECEIPTS FOR THE YEAR ENDING JUNE 30, 1936
AND COMPARISON WITH AVERAGE TAX REVENUE RETURNS

Expended for the benefit of residents of -	Primary System			State Secondary & Local Roads			City Streets & Alleys			All Roads		
	Expenditure	Ave. Tax Revenue Returns	Plus or Minus	Expenditure	Ave. Tax Revenue Returns	Plus or Minus	Expenditure	Ave. Tax Revenue Returns	Plus or Minus	Expenditure	Ave. Tax Revenue Returns	Plus or Minus
Unincorporated areas	2,318,227	2,336,033	+ 17,806	2,635,237	2,174,486	- 460,751		117,615	+ 117,615	5,153,464	4,628,134	- 525,330
Incorporated areas having a population of 1,000 or less	216,112	322,241	+106,129	138,217	147,151	+ 8,934	50,488	4,742	- 45,746	404,817	474,134	+ 69,317
Incorporated areas having a population of 1,001 to 2,500	266,656	389,114	+122,458	152,800	99,647	- 53,153	95,863	72,382	- 3,481	495,319	561,143	+ 65,824
Incorporated areas having a population of 2,501 to 5,000	112,009	178,212	+ 66,203	74,421	32,759	- 41,662	33,729	32,952	- 777	220,159	243,925	+ 23,764
Incorporated areas having a population of 5,001 to 10,000	295,322	414,287	+118,965	207,494	86,344	- 121,150	158,157	104,715	- 53,442	660,973	605,346	- 55,627
Incorporated areas having a population of 10,001 to 25,000	569,173	676,187	+107,014	362,782	110,208	- 252,574	195,151	310,464	+ 115,313	1,127,106	1,096,859	- 30,247
Great Falls	275,788	278,960	+ 3,172	169,767	27,784	- 141,983	109,273	280,766	+ 171,493	554,828	587,910	+ 32,662
Butte	286,742	300,213	+ 13,471	148,432	90,428	- 58,004	156,305	146,786	- 9,519	591,479	537,427	- 54,052
State of Montana	4,340,029	4,895,247	+555,218	4,089,150	2,768,807	-1,320,343	776,966	1,070,422	+ 291,456	9,208,145	8,734,476	- 473,669

Significant data deriving from the tabulations are as follows:

1. Average tax revenue returns for the Primary System as a whole would indicate that a re-allocation of expenditures in consideration of road use is necessary in the interest of equity.

2. The State Secondary System does not pay its way.

3. Additional moneys should be apportioned to city street funds if Road Use is the only criterion to be considered.

CHAPTER XII

ANALYSIS OF ADEQUACY OF EXISTING FINANCIAL PROVISIONS FOR SUPPORT OF THE SEVERAL SYSTEMS

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XII
ANALYSIS OF ADEQUACY OF EXISTING FINANCIAL PROVISIONS FOR SUPPORT OF THE SEVERAL SYSTEMS

Let it be said that the sum of all road revenues constitutes a limit of the desire of the Montana public to pay for road and street services. This statement is essentially an equation of condition whereby it is said that the status of the road plant at present reflects the wants or desires of this public in road service. Under existing financial provisions, funds for the administration of the entire road system originate with levies on road users (gasoline license tax and the motor vehicle registration law) and a general property tax levy on property owners a portion of which is distributed to the road, street and bridge funds for expenditure on local roads and streets.

12.01--Allocation of Costs Between the Road User and Property Owners.

Next, let it be said that this method in tax procedure furnishes a reasonable basis for the allocation of annual road costs between road users and property owners. This again is an equation of condition whereby we state that a taxing procedure such as we have, justifies its existence through acceptance and sanction of the public. This public is generally cognizant of the value of the road plant both in terms of road user benefits and intangible benefits touching on our whole economy. Road user benefits are apparent on improvement of a road system as a consequence of cheaper operating expense, improved alignment affords shorter driving distances, smoother surfaces tend to prolong tire life and lessen the effect of depreciation, and time savings which occur in consonance with distance savings operate to the financial betterment of the road user beneficiaries. Intangible benefits, not readily measured, are those relating to trade relationships, community welfare, civil administrative functions, recreational outlets and other activities attaching to our business and social welfare. Generally speaking these intangible benefits assume greater importance in the eyes of road boosters than do benefits more readily measured in terms of road use. This reasoning is entirely justified when we see the influx of out-of-state drivers since near completion of the Federal Aid System. Currently, it is estimated that these drivers, pleasure seekers in the main, spent millions in the state to the immediate advantage of our whole citizenry, both individually and collectively.

We have stated heretofore that our tax procedure furnishes a reasonable basis in the allocation of costs between road users and property owners and as brought out in the preceding paragraph, the benefits other than those accruing to the road users operate to the advantage of the whole public or to be more specific the public which pays a general property tax. If next we find the situs of this public with respect to each of the several systems we may then allocate or determine comparable property benefits attaching to residence along any of our several road systems. From data set forth in Chapter II, Section 2.06, we find that the Federal Aid System immediately serves 2.7 farm units and rural dwellings per mile, the State Secondary System serves 1.8 units per mile leaving the Land Service System immediately serving 0.6 units per mile. Each of these several farm units and rural dwellings paid $53.41 on the average into the road and bridge funds of the several counties in 1936. In accord with their location these payments totaled as follows:

Immediately Served by	Percent of Rural Population	General Property Tax For Road & Bridge Fund
Rural Federal Aid System	28.86%	$770,089
Rural State Secondary System	11.72%	312,732
Land Service	59.42%	1,585,539
All Rural Roads	100.00%	2,668,360

Repeating the essence of the previous discussion, these people have paid $2,668,360, as a part of the general property tax, into the road and bridge funds, which money represents a payment in consideration for tangible and intangible benefits attaching to road construction, this in keeping with previous concepts set forth herein. Certainly, a farm or rural unit would have no great value, were it not connected by road with a trading or shipping center. A road, aside from its value to the farmer or rural resident as a road user, furnishes a medium of transport whereby he may enrich himself in trade or enjoy educational and recreational facilities more readily available in urban areas.

With respect to the urban dweller, we find a condition whereby he pays a property tax, a portion of which is distributed for expenditure on city streets and a part of which goes to the road and bridge funds of the counties. At first glance one would say that the city dweller has no stake in the condition of county roads particularly when these funds originate with a levy on his real property and on his household furnishings. In explanation of the levy, however, we might state that basically all those people resident in rural areas are engaged in extractive industries while those who are resident in urban areas in the state are engaged in the business of processing these extracted products of the rural areas, the notable exception being Butte where copper ore is mined for processing in Anaconda. If not engaged in processing the products of the rural areas, the urban resident is interested in the trans-shipment of these products or in maintaining trade with rural residents. This business activity and attendant social and trade exchange is dependent on the transportation of commodities to a great extent and this transportation operates efficiently or otherwise depending on the condition of the roads in use. Summing up, we find that the urban dwellers individually and collectively are interested in maintaining the flow of commodities from rural areas for the reason that his business life is dependent thereon. This dependence, it is to be emphasized, lies in the identity of the urban dweller as a citizen who enjoys the intangible advantages of a road system and not in his identity as a road user. In keeping with this concept, the portion of the general property tax in urban areas which is spent on rural roads may be distributed to the various systems in proportion to the percentage of rural population immediately served by those systems. In 1936 urban residents paid $136,306 toward the up-keep of county roads on the Land Service System. The distribution of these funds as described is as follows:

System Designation	Percentage of rural population immediately served.	Amount
Federal Aid System	28.86	$ 39,338
State Secondary System	11.71	15,961
Land Service System	59.43	81,007
All Rural Roads	100.00	136,306

By interpretation, these data show in substance that the Federal Aid System if recompensed in accord with its service in trade and business would receive 28.86% of road funds originating from the general property tax in urban areas and now spent on local county roads. Similarly the State Secondary System would receive 11.71% and the Land Service System would be recompensed in the amount of 59.43%.

In addition to the revenues cited hereinabove, additional revenues for the administration of local streets and alleys in municipalities are raised through levy of the general property tax. For all practical purposes these revenues comprise the bulk of funds expended in the construction and maintenance of city streets and alleys. If we then interpret the intent of the levy literally, or in accord with conceptions set forth herebefore in the discussion, we say that city streets and alleys are of no great interest to the public as to highway road use and that the system serves principally to enhance the value of adjoining or abutting property in terms of convenience for trade relations, fire and police protection, health considerations and

other items attaching to the public welfare. We know, however, that road users in the strictest interpretation of the term are vitally interested in the upkeep of the city streets and alleys and certainly an adjustment of tax procedure in relation to this system would comprehend a levy on motor vehicles in recompense for the use of these streets. Since we are drawing rather broad conclusions concerning the allocation of costs between road users and property owners, let us accept the literal interpretation of the levy and say that road use in urban areas is of secondary importance other than on through routes. In support of this assumption we might cite the fact that streets and alleys were in existence before the advent of the motor vehicle; in other words, there was a certain need for streets and alleys as of that time and this need or necessity persists in an equivalent amount regardless of whether or not we use a motor vehicle.

Next, let us say that all local streets, regardless of whether or not they are on extensions of the Federal Aid System, or the State Secondary System, are of equal value in respect to the well being of the several municipalities affected. Those roads which serve as urban extensions of the Federal Aid System and the State Secondary System are of service to both "through" and local traffic and of necessity are built to higher standards to withstand heavier traffic with a resultant increase in cost. Naturally, this increase in cost should be borne by motor vehicle or road users since they are the ones who prompted the increase in costs. Distributing these community benefits in terms of revenue inherent in ownership of the city streets and alleys, we have results as follows:

System Designation	Mileage	Allocation of Revenues Originating With the General Property Tax Levy for Expenditure on Urban Streets and Alleys
Urban Extensions of Federal Aid System	135.0	$ 40,065
" " " State Secondary	31.3	9,289
Local Streets and Alleys	2033.4	603,465
All Streets & Alleys in Municipalities	2199.7	652,819

This tabulation assumes benefits in equality with revenues, that is to say the amount of revenue necessary to maintain and administer the city streets and alleys in 1936 was equal to value received in community welfare and other intangibles not readily measured attaching to our statewide economy.

Summarizing all the values set forth hereinbefore, we have results as follows:

System Designation	Mileage	Allocation of Revenues Originating With the General Property Tax	
Federal Aid System, Rural & Urban	5554.0	$ 849,492	24.57%
State Secondary System, Rural & Urban	3314.1	337,982	9.77%
Land Service System	57028.5	1,666,546	48.21%
Local Streets & Alleys	2033.4	603,465	17.45%
All Roads, Streets & Alleys	67930.0	3,457,485	100.00%

This tabulation states in essence that the Federal Aid System in 1936 for services rendered in benefits other than those attaching to road use, should be recompensed in the amount of $849,492 from revenues originating with the general property tax levy. Similarly the State Secondary System should be recompensed in the amount of $337,982 and county roads of the Land Service System and local streets and alleys should be recompensed in the amount of $1,666,546 and $603,465 respectively. These data are at odds with present practice in road fund expenditures since all revenues deriving from the general property tax levy are now expended on local county roads and completed sections of the State Secondary System for which the counties are

responsible for maintenance and city streets and alleys in municipalities. The data are presented as tabulated, in an attempt to set up values other than those attaching to road use so that we may ascertain what costs should be allocated to the use of the motor vehicle for each of the several systems under accepted controls set up in our current road tax procedure.

The gasoline license tax levy and the motor vehicle license tax furnishes revenues originating with road use. In 1936, road users paid a total of $5,694,851, of which $4,455,250 originated with the gasoline license tax levy and $1,239,601 derived from the motor vehicle license tax. This amount plus the fund deriving from the general property tax levy totaled $9,152,336 and constituted the principal source of road revenues for Montana. In short, revenues originating with road use comprised 62.22% of the whole and revenues from the general property tax were 37.78% of the whole. This is not a statement whereby it is maintained that road revenues should accumulate in this ratio, it is merely a statement to the effect that road revenues accumulate in this ratio in Montana.

Another principal source of revenue originates with Federal Aids and Grants. Under ordinary circumstances these funds are forthcoming in the amount of 56% of the cost of construction excluding items relating to administration and the purchase of right-of-way on the Federal Aid System and as much as is necessary, limited by appropriation, for maintenance and construction of roads in the national reserves. With respect to Federal Aid we find no specific mention in consideration of road use. These funds are allocated to the several states, one-third in the ratio which the area of each state bears to the total area of all the states, one-third in the ratio which the population of each state bears to the total population of all the states - - - - -, one-third in the ratio which the mileage of the rural delivery routes and star routes in each state bear to the total mileage of rural delivery routes and star routes in all the states - - - - -.

In other words, the Federal Government is entirely cognizant of the fact that roads have values in addition to those attaching to road use. On the other hand, the road users in the state pay a Federal gasoline tax in the amount of $0.01 per gallon which operates to decrease the Federal grants by 20% of the state gasoline license tax levy. This leaves a balance which we have labelled as "Net Federal Aid" in other tabulations and is not a complete grant in the fullest sense of the word. In addition to the Federal gasoline tax, road users pay a Federal tax on lubricating oils, tires, equipments, parts, etc., all of which should be returned to the state in the form of road funds according to concepts now prevalent in highway administrative circles, and national associations of road users. We know therefore, that the net Federal Aid represents revenues returned to the state in consideration of Federal levies on lubricating oil, tires, etc. and a balance which we may consider as a grant. Those revenues originating as a circumstance of the Federal levy on tires, oil, etc. are adjudged to be in consideration of road use; the grant would be allocated to the road user and in consideration of social necessity. Data at hand gives no clue as to rightful proportions which should govern in the allocation of the grant, accordingly this department assumes that the whole of the net Federal Aid may reasonably be allocated in the ratio in which road funds originate in Montana, namely 62.22% in consideration of road use and 37.78% in consideration of social necessity. (See Tables 87A & B). In so doing we recognize that the net Federal Aid comprises funds originating with the Federal levies and an outright grant and that these monies are returned to the state presumably in the same ratio as regards allocation of costs as is in evidence with road revenues which originate with road tax levies in the state.

Lastly we have receipts originating with other General Revenue receipts as set forth in Chapter XI. These revenues, a minor item in relation to the whole of road revenues, we would say are dependent on circumstances entirely outside the province of the road user.

Now let us set up an hypothesis whereby each of the several revenues are redistributed to each of the several systems in accord with their origin in terms of road use or as they originate in service of the state as a whole in terms of intangibles in consideration of social necessity. To do this we must make assumptions as follows:

(1) There is a central road authority who is interested in allocating funds equitably in service of the road user or the property holder, as the case may be.

(2) Road revenues deriving from the general property tax will be returned to each of the several systems in accord with their service in community welfare, trade relations, etc. as previously set forth.

(3) Funds for maintenance of the Federal Aid System and construction-maintenance of the county roads on the Land Service System and maintenance of state improved sections of the State Secondary System, which originate with road use will be returned in accord with vehicle mileage generated on each of the several systems.

(4) Funds accumulating in the state for matching with Federal funds which originate with road use will be returned to each of the several systems in accord with the generation of vehicle mileage.

(5) Since we are attempting allocation under ordinary circumstances we will set up Federal funds for construction along the Federal Aid System and the State Secondary System on the percentage basis set forth in Chapter IX, i.e. 56.99% for the Federal Aid System and 53.79% for the State Secondary System.

(6) Road revenues originating with other general revenue receipts will be distributed in accord with the procedure set up herebefore in regard to the disposition of road revenues originating with the general property tax levy.

The table sets forth information as follows:

TABLE 67A
SHOWING ALLOCATION OF COSTS BETWEEN ROAD USERS (Motor Vehicles) AND OTHER COMMUNITY INTERESTS IN MONTANA IN THE YEAR 1936

System Designation	Road Revenues Originating in the Interest of Community Welfare, Trade Relationships, Civil Administration, etc. (Non Road Use)					Revenues Originating With Road Use								Grand Totel
	General Proparty Tex Levy	Other General Revenue Receipts	Federal Aids & Grants	Federal Appro-priation	Sub-Totel	Gas Tax for Maintenance and Construction Maintenance	Motor Vehicle License Tax for Maintenance and Construction	Gas Tax for Betterments	Gas Tax for Matching with Federal Aid Funds in Construction	Federel Gas Tax Applied on Construction	Federel Aids & Grants	Federal Appro-priation	Sub-Total	
Federal Aid System Rural	$ 809,422	$ 23,285	$282,093	$ 469	$1,115,269	$ 929,955	$ 776,544	$141,334	$1,726,875	$559,633	$1,446,454	$ 772	$5,503,567	$ 6,618,836
State Secondary Syetem Rural	328,691	9,455	114,543	5,268	457,957	170,989	143,149	25,987	317,517	102,690	152,154	8,676	921,370	1,379,327
Land Service System	1,666,546	47,955	580,936	70,436	2,365,873	318,272	266,452	46,370	591,013	191,531	64,506	116,001	1,447,151	3,813,004
Federel Aid Syetem Urban	40,070	5,544			45,614	57,450	48,097	8,731	106,682	34,573	89,608		345,141	390,755
Stete Secondary System Urban	9,291	1,285			10,576	4,013	3,359	610	7,452	2,415	6,259		24,108	34,684
Local Streets & Alleys	603,465	83,505			686,970									686,970
All Roads & Streets	$3,457,485	$171,029	$977,572	$76,173	$4,682,259	$1,480,679	$1,239,601	$225,032	$2,749,539	$891,050	$1,609,907	$125,449	$8,321,317	$13,003,576

TABLE 87B

SHOWING ALLOCATION OF COSTS BETWEEN ROAD USERS (Motor Vehicles) AND OTHER COMMUNITY INTERESTS IN MONTANA IN THE YEAR 1936.

System Designation	Mileage	Revenues Originating in Service of Community Welfare, Civil Administration, Trade Relationships, etc.	Revenues Originating with Road Use	Grand Total All Revenues
Federal Aid System Rural	5419.0	16.65%	83.35%	100.00%
Federal Aid System Urban	135.0	11.67%	88.33%	100.00%
Federal Aid System Rural & Urban	5554.0	16.37%	83.63%	100.00%
State Secondary System Rural	3282.8	33.20%	66.80%	100.00%
State Secondary System Urban	31.3	30.49%	69.51%	100.00%
State Secondary System Rural & Urban	3314.1	33.13%	66.87%	100.00%
Land Service System	57028.5	62.05%	37.95%	100.00%
Land Service System & State Secondary System, Rural	60311.3	54.39%	45.61%	100.00%
Local Streets & Alleys	2033.4	100.00%		100.00%
All Roads, Streets and Alleys in Urban areas	2199.7	66.81%	33.19%	100.00%
All Rural Roads and Streets & Alleys	67930.0	36.01%	63.99%	100.00%

These tables are not to be accepted as "gospel" in matters relating to the true allocation of costs between motor vehicles and the general tax payer; they are indicative, however, of the trend in such allocation as dictated or influenced by a tax procedure of long standing which has been accepted and sanctioned by Montana residents. The whole question of the true allocation of costs is one involving a number of controversial factors, or elements in the computation of annual costs in relation to benefits which accumulate as a circumstance of the expenditure of road funds.

On comparison of the ratios set forth we find general accord with the findings of economists and road authorities in other states. The tabulation of these results follows hereinafter.

TABLE 88

SHOWING COMPARISON OF EFFECTIVE MONTANA ALLOCATION TO ROAD USERS WITH RESULTS OF OTHER STUDIES

System Designation	Montana	Missouri Cost Study	Eastman Report	Breed-Older-Downs Study	Oregon Highway Commission	Illinois Division of Highways	Average
Primary Highways	83.63%	90.00%	80.00%	90.60%	85.60%	90.00%	86.64%
County & Local Roads	45.61%	66.00%	24.00%	90.60%	10.90%	60.00%	49.52%
City Streets	33.19%	50.00%	21.10%	48.10%	18.50%	50.00%	36.82%

The allocations published as the results of studies in other states are not strictly comparable with Montana data. Some of the studies refer to the national picture, the Eastman Report in particular, other studies refer to conceptions extant in other states and some of the studies reflect a seeming prejudice in favor of transportation mediums other than highways. In any case the allocations set forth as representative of the Montana concept are generally in accord with the others in that we say primary highways should be supported principally by road user revenues and that local streets and roads of the Land Service System should be supported by revenues originating with levies in consideration of social betterment embodied in improved trade relationships, civil administration, police and fire protection and other functions, previously mentioned.

12.02 Comparison of Revenue Earnings From the Several Systems With the Annual Cost Therefor in 1950

Section 12.01 treats in detail with the allocation of costs in Montana between the road users and the general public embodied in the property owners. To present such an hypothesis it was necessary that we make some few assumptions relating to the intent of the several levies in the interest of the road system in whole. For example we said that the Federal Aid System in relationship to the rural population served, should receive 28.86% of the total road revenues originating with rural residents as a circumstance of the general property tax levy; we also said that the Land Service System, in relation to its use in terms of vehicle mileage, should receive $957,655 as a circumstance of the gasoline license tax levy. By making such assumptions we were enabled to draw certain broad conclusions relating to the allocation of costs between the road users and other beneficiaries as set forth in tables 87A and 87B. The allocations, limited and controlled by our taxing procedure and long continued acceptance and sanction of the public are particularly true with respect to the picture of highway finance in whole in the state, however, we find the assumptions in regard to allocation of costs with respect to each of the several systems at odds with actual practice in matters relating to road revenues and the expenditure of such revenues. The actual source of our road revenues and the system or systems on which each of these several revenues are expended is given as follows:

Source of Revenue	Expended on -	Remarks
Gasoline License Tax	Federal Aid System & State Secondary System	For maintenance, construction and administration of the Federal Aid System and construction and administration of improved sections of the State Secondary System.
Motor Vehicle License Tax	County roads of the Land Service System and State improved sections of the State Secondary System and city streets and state improved sections of the Federal Aid System and the State Secondary System in urban areas.	For care and upkeep of county roads on the Land Service System and maintenance of State improved sections of the State Secondary System and a portion for the care and upkeep of the streets of Butte.

Source of Revenue	Expended on -	Remarks
General Property Tax	County roads of the Land Service System and State improved sections of the State Secondary System and city streets and alleys	For care and upkeep of county roads on the Land Service System and maintenance of State improved sections of the Federal Aid System and the State Secondary System in urban areas and maintenance of State improved sections of the State Secondary Systems in rural areas and care and upkeep of city streets and alleys.
Other General Revenue	Same as above.	Same as above.
Federal Gas Tax	Federal Aid System & State Secondary System	These funds represent a portion of the usual allotment of Federal Aid money with which state funds, originating with the gasoline license tax are matched for expenditure in construction of the Federal Aid System and the State Secondary System.
Federal Grants in Aid	Federal Aid System & State Secondary System	These funds represent the balance of the usual Federal Aid allotment with which State funds are matched for expenditure in construction of the Federal Aid System and the State Secondary System
Federal Appropriations	Roads traversing National Reservations	For care and upkeep of unimproved roads traversing Federal lands which form a part of the Land Service System the State Secondary System or the Federal Aid System.

To render a comparison of revenue earnings for each of the several systems and the annual cost therefor as of the year 1950, we must first estimate the totals of each of the revenues as of that time. In keeping with forecasts set forth in Chapter IV we believe it is logical, and reasonable to expect revenues to be as follows:

Gasoline License Tax - The gross receipts originating with road use will be $6,096,354.

Motor Vehicle License Tax - Presuming the gross receipts to increase in accord with motor vehicle registration, it is estimated that the gross receipts will be $1,554,717.

General Property Tax - Levy - Presuming these receipts will increase in accord with population growth it is estimated that the receipts in the road, bridge and street funds will be $3,718,076.

Other General Revenue - Presuming these receipts will increase in accord with population growth, it is estimated that these receipts will be $183,920.

Federal Gas Tax - These funds will be one-fifth of the total gasoline license tax receipts or $1,219,271.

Federal Grants in Aid - Federal funds necessary in the construction of the Federal Aid System and the State Secondary System as set forth in Chapter IX total $4,891,812. This amount, less $1,219,271 or $3,672,541 represents the net Federal Aid to the State. These funds, in the table which follows this discussion, are spread over the whole of the Federal Aid System and the State Secondary System in both rural and urban areas, for the reason that we cannot reasonably expect Federal Aid in such sums as are required in the construction of the Federal Aid System and the Secondary System as contemplated in Chapter IX, particularly under existing regular methods in the allotment of Federal funds to the several states. Aside from other considerations, the Chapter brings forth the need and necessity for an increase of Federal funds in our general highway program.

Federal Appropriations- Representing funds necessary in the maintenance and administration of roads traversing Federal lands which will comprise a part of the Land Service System as of 1950. Data in Chapter IX would indicate that these funds will not exceed $186,437. Many of the roads now traversing Federal lands will be included in either the Federal Aid System or the State Secondary System as of 1950, and Federal funds now necessary in the upkeep of these roads will be switched in the future to appear as money granted in Federal Aid.

So much for the source and direction of expenditure of road funds and the estimated amount of road revenues in 1950. Next we must establish reason and logic as to the source of specific revenues for each of the several systems in accord with the data brought forth herebefore and in line with what we may expect as to road use in the future and the measure of social necessity touching upon and relating to road use as of 1950.

Generally speaking, we may expect that travel habits of the public will change in accord with the extension of the Federal Aid System and the State Secondary System. For purposes of comparison we will say that the Federal Aid System will be increased to 5869.0 miles (5719.0 miles rural and 150.0 miles urban) and that the Secondary System will be increased to a length of 6750.0 miles (6700.0 miles rural and 50.0 miles urban). The Land Service System will be decreased in the amount of 2787.9 miles and will be 54,240.6 miles. This result is founded on the idea that three-fourths of the extensions of the Federal Aid System and the State Secondary System (3717.2 miles) will retire previous mileage on the Land Service System. Local streets and alleys will be decreased by 33.7 miles, this representing extensions of the Federal Aid System and the State Secondary System in urban areas. In accord with estimates set forth in Chapter IV, the measure of road use in terms of vehicle miles for each of the several systems will be as follows:

Road System	Rural or Urban	Mileage	Vehicle Miles Per Year	
			(000) miles	Percent
Federal Aid System	Rural	5719.0	1,048,716	57.34
Federal Aid System	Urban	150.0	56,943	3.12
State Secondary System	Rural	6700.0	322,778	17.65
State Secondary System	Urban	50.0	5,280	0.29
Land Service System	Rural	54240.6	247,526	13.53
Local Streets & Alleys	Urban	1999.7	147,586	8.07
All Roads, Streets & Alleys	Rural & Urban	68859.3	1,828,829	100.00

As to the measure of service in relation to rural population served for each of the rural road systems we will say that the Federal Aid System and the State Secondary System will serve at the same rate as they do now, namely 2.7 units per mile for the Federal Aid System and 1.8 units per mile for the State Secondary System, leaving the Land Service System serving 0.5 units per mile. These rates in service are estimated on the basis that there will be a 7.54% increase in population in accord with forecasts set forth in Chapter IV. Tabulating these estimates we have results as follow:

Rural Road System	Mileage	No. of farm units or Rural Dwellings immediately served per mile	No. of farm units or Rural Dwellings immediately served	Percentage
Federal Aid System	5719.0	2.7	15,441	28.74%
State Secondary System	6700.0	1.8	12,060	22.45%
Land Service System	54240.6	0.5	26,226	48.81%
All Rural Roads	66659.6	0.8	53,727	100.00%

In keeping with previous discussion, we will say that revenues originating with the general property tax in urban areas for expenditure on rural roads will be returned to each of the rural road systems in accord with the percentages set forth hereabove; then in line with existing administrative controls whereby the funds are expended only on county roads or on the maintenance of state improved sections of the State Secondary System, we will redistribute the funds apparently directed to the Federal Aid System to the Land Service System and the State Secondary System in accord with their relative measure of service. With respect to revenues originating with the general property tax in urban areas for expenditure on city streets and alleys, we will say that each of the systems have equal value per mile in consideration of social necessity.

Having established the controls which regulate the origin of our road revenues i.e., the origin of road user revenues in terms of vehicle miles and the origin of revenues in consideration of social necessity, our next step is to show the origin of specific revenues by systems as such origin is affected by current road administrative procedure in relation to the direction of expenditure. The allocation of our road revenues as estimated for the year 1950 is as follows:

(1) Montana Gasoline License Tax - Road User Revenue

This revenue originates as a circumstance of road use. Under current administrative requirements, these funds will be spent on the Federal Aid System and the State Secondary System and such expenditure comprehends use of funds which originated with use of the Land Service System and local streets and alleys. In accord with the vehicle mile distribution set forth herebefore the funds originate as set forth below.

System Designation	Mileage	Road User Revenue Originating with Montana Gasoline License Tax	Percent of Total Revenue	Percent of Revenue Originating with Use of the Federal Aid System and the State Secondary System
Federal Aid, Rural	5719.0	$3,425,220	56.18%	72.64
Federal Aid, Urban	150.0	194,662	3.20	4.13
State Secondary, Rural	6700.0	1,077,458	17.67	22.85
State Secondary, Urban	50.0	18,047	0.30	0.38
Sub-Total	12619.0	4,715,387	77.35	100.00
Land Service System	54240.6	876,390	14.38	
City Streets & Alleys	1999.7	504,577	8.27	
Sub-Total	56240.3	1,380,967	22.65	
Total All Roads, Streets & Alleys	68859.3	$6,096,354	100.00	

The percentage factors listed with respect to road user revenues hereabove are not in strict accord with the percentage factors listed in respect to vehicle mileage for the reason that some systems, notably the Land Service System have a higher proportion of truck traffic with a resultant total increase in gasoline consumption per vehicle. We find from the tabulation that 77.35% of all gasoline tax revenues originate with use of the Federal Aid System and the State Secondary System and 22.65% originates with use of the Land Service System and local streets and alleys. In accord with the limiting features of our road administrative policy whereby all gasoline tax revenues are to be expended on the Federal Aid System and the State Secondary System, let us next say in effect that gasoline license taxes are paid only on gasoline consumed on these systems. We would then distribute $1,380,967 to the Federal Aid System and the State in accord with the relationships obtaining with respect to revenues actually originating with use of these systems as follows:

System Designation	Gas Tax Revenues Originating with all Road Use	Distribution of Revenues Originating with Use of the Land Service System & City Streets	Net Specific Revenue
Federal Aid, Rural	$3,425,220	$1,003,134	$4,428,354
Federal Aid, Urban	194,662	57,034	251,696
State Secondary, Rural	1,077,458	315,551	1,393,009
State Secondary, Urban	18,047	5,248	23,295
Sub-Total	4,715,387	1,380,967	$6,096,354
Land Service System	876,390	- 876,390	
Local Streets & Alleys	504,577	- 504,577	
Sub-Total	1,380,967		
Total All Roads, Streets, Alleys	$6,096,354		

In the tabulated comparison which follows the detailed discussion of specific revenues and annual costs, it will be noted that the Federal Aid Systems and State Secondary Systems are classified in traffic volume groups, this to show relatively higher returns in road use revenues in accord with higher estimated traffic volumes.

(2) Montana Motor Vehicle Registration - Road User Revenue

These funds will originate generally in accord with the vehicle mileage distribution set forth herebefore. The estimate of the amount of such revenue and the source in terms of system use are as follows:

System Designation	Mileage	Road User Revenue Originating with Montana Motor Vehicle License Tax	Percent of Total Revenue
Federal Aid, Rural	5719.0	$ 870,819	56.01%
Federal Aid, Urban	150.0	49,828	3.21%
State Secondary, Rural	6700.0	274,835	17.67%
State Secondary, Urban	50.0	4,620	0.30%
Sub-total	12619.0	1,200,102	77.19%
Land Service System	1999.7	225,456	14.50%
Local Streets & Alleys	54240.6	129,159	8.31%
Sub-total	56240.3	354,615	22.81%
Total All Roads, Streets & Alleys	68859.3	1,554,717	100.00%

As of the year 1936, revenues in the amount of $33,563 which originated with the levy of the state motor vehicle license tax in Butte were distributed for the construction of streets in that city. Assuming this amount to increase in accord with the total motor vehicle license tax revenue we find these revenues increasing to $42,095 and to be distributed as follows:

System Designation	Mileage	Motor Vehicle License Tax Revenues Originating with Use of Urban Roads, Streets & Alleys	Percentage	Distribution Revenues Originating with Motor Vehicle License Tax in the City of Butte	Leaving Funds for Distribution to Land Service System and State Secondary as follow
Federal Aid, Urban	150.0	$ 49,828	27.14%	11,425	$ 38,403
State Secondary, Urban	50.0	4,620	2.51%	1,059	3,561
Local Streets & Alleys	1999.7	129,159	70.35%	29,611	99,548
All Roads, Streets & Alleys	2199.7	$183,607	100.00%	42,095	$141,512

Those funds remaining for distribution to the county roads of the Land Service System and for maintenance of state improved sections of the State Secondary and those funds originating with the use of the Federal Aid System in rural areas will total $1,012,331. These will be distributed in accord with the relationship of earned revenues on the State Secondary System and the Land Service as follows:

System Designation	Mileage	Earned Motor Vehicle License Tax Revenues on All Systems	Distribution of Revenues Originating With the Use of City Streets & Alleys	Distribution of Revenues Originating With Use of Rural Federal Aid System and City Streets and Alleys	Net Revenues Originating With the Montana Motor Vehicle License Tax
Federal Aid, Rural	5719.0	$870,819		-$870,819	0
Federal Aid, Urban	150.0	49,828	-38,403		$ 11,425
State Secondary, Rural	6700.0	274,835		+ 556,124	830,959
State Secondary, Urban	50.0	4,620	- 3,561		1,059
Land Service System	54240.6	225,456		+ 456,207	681,663
Local Streets & Alleys	1999.7	129,159	-99,548		29,611
All Roads, Streets, & Alleys	68859.3	$1,554,717	-141,512	+ 141,512	$1,554,717

(3) General Property Tax - Revenues in Consideration of Social Necessity

Tracing the origin of these revenues in accord with the estimated measure of service rendered by each of the several systems we have results as follows:

System Designation	Paid by Rural Residents in Accord With Their Location by Systems	Paid by Urban Residents in Consideration of Social Necessity	Paid by Urban Residents in Accord with Their Location By Systems	Total Road Revenue Originating with the General Property Tax Levy.
Federal Aid, Rural	$ 824,678	$ 42,126		$866,804
State Secondary, Rural	644,105	32,902		677,007
Land Service System	1,400,690	71,552		1,472,242
Federal Aid, Urban			$ 47,872	47,872
State Secondary, Urban			15,957	15,957
Local Streets & Alleys			638,194	638,194
All Roads, Streets & Alleys	$2,869,473	$146,580	$702,023	$3,718,076

In accord with the intent of the levy those funds generated on the rural Federal Aid System will be distributed to the Land Service System and the State Secondary System in proportions manifest in the earned revenue for these systems and revenues originating in urban areas will be distributed to the city street systems as shown above. Redistribution of these revenues is shown hereinafter.

System Designation	Earned Revenues For All Roads, Streets & Alleys	Distribution of Revenues in Accord With Administrative Controls	Total Revenues Originating with General Property Tax Levy
Federal Aid, Rural	$ 866,804	- 866,804	
Federal Aid, Urban	47,872		$ 47,872
State Secondary, Rural	677,007	+ 273,041	950,048
State Secondary, Urban	15,957		15,957
Land Service System	1,472,242	+ 593,763	2,066,005
Local Streets & Alleys	638,194		638,194
All Roads, Streets & Alleys	$3,718,076		$3,718,076

(4) Other General Revenue Receipts - Revenue in Consideration of Social Necessity.

It is estimated that these revenues will increase to $183,920 of which rural residents will pay $64,657, urban residents will pay $21,850 for care and upkeep of county roads on the Land Service System and $97,413 for the care and upkeep of the city streets and alleys. The distribution of earned revenues will then be as follows:

System Designation	Earned Revenues Originating on the Land Service System and City Streets & Alleys	Earned Revenues Originating on City Streets and Alleys & Allocated to Rural Roads	Total Revenues All Systems
Federal Aid, Rural	$ 18,582	6,280	24,862
State Secondary, Rural	14,513	4,905	19,418
Land Service System	31,562	10,665	42,227
Sub-Total	64,657	21,850	86,507
Federal Aid, Urban	6,643		6,643
State Secondary, Urban	2,214		2,214
City Streets & Alleys	88,556		88,556
Sub-Total	$97,413		$ 97,413
Total All Roads, Streets & Alleys	$162,070		$183,920

Since the funds earned on the Federal Aid System will be expended on county roads of the Land Service System and in maintenance of state improved sections of the State Secondary System, we must then make a new distribution to show the net specific revenue as follows:

System Designation	Earned Revenue For All Roads, Streets and Alleys	Distribution of Revenues in Accord with Administrative Controls	Total Revenues All Systems
Federal Aid, Rural	$ 24,862	- 24,862	
State Secondary, Rural	19,418	+ 7,917	$ 27,335
Land Service System	42,227	+ 16,945	59,172
Sub-Total	86,507		86,507
Federal Aid, Urban	6,643		6,643
State Secondary, Urban	2,214		2,214
Local Streets & Alleys	88,556		88,556
Sub-Total	$ 97,413		$ 97,413
Total All Roads, Streets, & Alleys	$ 183,920		$183,920

As regards all road revenues originating with Montana levies in 1950, we find the allocation between road users and property owners to be as follows:

Montana Gasoline License Tax	- Road User Revenue	$6,096,354	52.77%
Montana Motor Vehicle License Tax	- Road User Revenue	1,554,717	13.46%
Sub-Total	- Road User Revenue	$7,651,071	66.23%
General Property Tax	- Revenue in Consideration of Social Necessity	3,718,076	32.18%
Other General Revenue	- Same as Above	183,920	1.59%
Sub-Total, All Revenue in Consideration of Social Necessity		$3,901,996	33.77%
Total All Road Revenue		$11,553,067	

(5) Federal Gas Tax - Road User Revenue

For purposes of comparison the Federal Gas Tax is here considered as a portion of the total Federal grants in aid in construction of the Federal Aid System and the State Secondary System. Since the tax is one-fifth of the state gas tax, we will distribute this revenue on that basis. Results of the computation are set forth herebelow.

System Designation	Earned Revenue Originating with the Montana Gasoline License Tax Levy	Earned Revenue Originating with Federal Gas Tax (One-fifth of State Gas Tax)	Specific Revenue Originating with Montana Gasoline License Tax Levy	Specific Revenue Originating with Federal Gas Tax (One-fifth State Gas Tax)
Federal Aid, Rural	$3,425,220	$ 685,044	$4,428,354	$ 885,671
Federal Aid, Urban	194,662	38,932	251,696	50,339
State Secondary, Rural	1,077,458	215,492	1,393,009	278,602
State Secondary, Urban	18,047	3,609	23,295	4,659
Sub-Total	$4,715,387	$ 943,077	$6,096,354	$1,219,271
Land Service System	876,390	175,278		
Local Streets & Alleys	504,577	100,916		
Sub-Total	$1,380,967	$ 276,194		
Total All Roads & Alleys	$6,096,354	$1,219,271	$6,096,354	$1,219,271

(6) Federal Grants in Aid - 66.23% in consideration of road users and 33.77% in consideration of Social Necessity.

The construction of the Federal Aid System and the State Secondary System comprehends a Federal grant of $4,891,812. Subtracting $1,219,271 included in the Federal gas tax leaves a balance of $3,672,541. Of this total, $2,432,324 (66.23%) is assumed to be granted in consideration of road use and $1,240,217 will be granted in consideration of social necessity on the rural section of the Federal Aid System and the State Secondary System. Distributing the grant in consideration of road use we have results as follows:

System Designation	Earned Revenue in Accord with Road Use of All Systems	Distribution in Accord with Administrative Controls	Net Specific Revenue Originating with Federal Aid in Consideration of Road Use
Federal Aid, Rural	$1,366,595	+ 400,226	$1,766,821
Federal Aid, Urban	77,666	+ 22,744	100,410
State Secondary, Rural	429,884	+ 125,899	555,783
State Secondary, Urban	7,200	+ 2,110	9,310
Sub-Total	1,881,345	+ 550,979	$2,432,324
Land Service System	349,663	- 349,663	
Local Streets and Alleys	201,316	- 201,316	
Sub-Total	550,979	- 550,979	
Total All Roads, Streets & Alleys	$2,432,324		$2,432,324

With respect to Federal grants in aid in consideration of social necessity, we deem these to be tendered to rural sections of the several systems and generally in accord with the proportions set forth in regard to revenues originating with the general property tax in rural areas. The distribution of these funds then would be as follows:

System Designation	Earned Revenue in Accord with Location of Rural Population on the Several Systems	Distribution in Accord with Administrative Controls	Net Specific Revenue Originating with Federal Grants in Aid on Consideration of Social Necessity
Federal Aid, Rural	$356,435	+ 339,911	$ 696,346
State Secondary, Rural	278,389	+ 265,482	543,871
Land Service System	605,393	- 605,393	
All Rural Roads	$1,240,217		$1,240,217

Combining the results of these two tabulations we may estimate the revenue originating with Federal Grants in Aid as follows:

System Designation	Net Specific Revenue Originating With Federal Grants in Aid
Federal Aid, Rural	$2,463,167
Federal Aid, Urban	100,410
State Secondary, Rural	1,099,654
State Secondary, Urban	9,310
All Roads and Streets on the Federal Aid and State Secondary Systems	$3,672,541

(7) Federal Appropriations - 66.23% in consideration of road users and 33.77% in consideration of social necessity.

These funds represent an estimate of costs for roads on the Land Service System as of 1950 for which Federal appropriations must be made. As set forth herebefore the cost is estimated to be $186,437.

This concludes the discussion relating to specific revenues, their source and the distribution of same to each of the several systems. As regards costs we find these data summarized by traffic volume groups in Chapter IX for rural sections of the Federal Aid System and the State Secondary System. Urban sections of these systems are estimated to cost $1,403 per mile per year, this being the estimated cost of a 30 foot section in rural areas and fairly representative of costs in urban areas. To this cost is added a sum equal to the cost of collection of the gasoline license tax and a charge to offset exempt gasoline consumption and the cost of collection of motor vehicle license tax, since revenues set forth herebefore comprehend gross revenues originating with road use. Costs for county roads and local streets are estimated to be equal to the revenues accruing to these systems after proper provision is made for expenditure on other systems.

With these points in discussion in mind, Table 89 as follows is presented to show the comparison of anticipated revenues and annual costs as of 1950.

TABLE 89
COMPARISON OF ESTIMATED ROAD REVENUES AND ANNUAL COSTS AS OF 1950.

System Designation	Traffic Volume Groups	Specific Revenues						Total Revenue (Cumulative)	Annual Cost Data		Comparative Data	
		Gas Tax	Motor Vehicle Licence Tax	General Property Tax	Other General Revenue Receipts	Federal Gas Tax	Federal Grants in Aid Plus Appropriations		For Mileage in Each Traffic Volume Group	For All Mileage (Cumulative)	Revenues in Excess of Expenditures	Expenditures in Excess of Revenues
Federal Aid System Rural	2100 & Over	$ 158,292				$ 31,658	$ 67,257	$ 257,207	$ 47,561	$ 47,561	$ 209,646	
	1050 - 2099	849,422				169,885	391,332	1,667,846	568,523	616,084	1,051,762	
	350 - 1049	2,820,428				564,086	1,459,207	6,511,567	3,376,731	3,992,815	2,518,752	
	175 - 349	399,459				79,892	280,807	7,271,725	1,107,308	5,100,123	2,171,602	
	70 - 174	161,022				32,361	171,340	7,637,259	908,840	6,008,963	1,628,296	
	Less than 70	38,931				7,786	93,216	7,777,192	626,711	6,635,674	1,141,518	
	All Traffic	$1,428,354				$ 885,671	$2,463,167	$7,777,192	$ 6,635,674			
Federal Aid System (Urban)	All Traffic	$ 251,696	$ 11,425	$ 47,872	$ 6,643	$ 50,339	$ 100,410	$ 468,385	$ 210,450	$ 210,450	$ 257,935	
State Secondary System (Rural)	2100 & Over	$ 14,098	$ 8,410	$ 440	$ 12	$ 2,820	$ 5,877	$ 31,657	$ 4,008	$ 4,008	$ 27,649	
	1050 - 2099	87,962	52,471	5,772	166	17,592	36,399	234,019	49,117	53,125	180,894	
	350 - 1049	216,542	129,171	41,915	1,206	43,309	110,391	776,553	344,317	397,442	379,111	
	175 - 349	479,633	286,111	167,534	4,821	95,927	287,272	2,097,851	1,282,884	1,680,326	417,525	
	70 - 174	418,564	249,682	345,761	9,948	83,713	364,936	3,570,455	2,411,112	4,091,438		$ 520,983
	Less than 70	176,210	105,114	388,626	11,182	35,241	292,779	4,579,607	2,515,439	6,606,877		2,027,270
	All Traffic	$1,393,009	$ 830,959	$ 950,048	$ 27,335	$ 278,602	$1,099,654	$4,579,607	$ 6,606,077			
State Secondary System (Urban)	All Traffic	$ 23,295	$ 1,059	$ 15,957	$ 2,214	$ 4,659	$ 9,310	$ 56,494	$ 70,150	$ 70,150		$ 13,656
Land Service System	All Traffic		$ 681,663	$2,066,005	$ 59,172		$ 186,437	$2,993,277	$ 2,993,277	$ 2,993,277		
Local Streets & Alleys	All Traffic		$ 29,611	$ 638,194	$ 88,556			$ 756,361	$ 756,361	$ 756,361		
All Roads, Streets & Alleys	All Traffic	$6,096,354	$1,554,717	$3,710,076	$183,920	$1,219,271	$3,858,978	$16631,316	$17272,789	$17,272,789		$ 641,473

12.03 Significant Data Deriving From Comparison of Estimated Revenues and Annual Costs as of 1950.

Table 89 recognizes road revenues as they will exist in relation to estimated costs in 1950. Our tax procedure in matters relating to road and street affairs, as shown in the early section of this chapter, is entirely cognizant of the intangible benefits in consideration of social necessity and the benefits to the road user which attach to ownership of a comprehensive highway system. In the distribution of these funds, however, we are somewhat wanting in apparent rationalism in that road user revenues are tendered principally to the Federal Aid Systen and revenues accumulating in consideration of social necessity are allocated to the Land Service System and local roads and streets and the State Secondary System. This method of equalization while fair in the main, leads to faulty reasoning as regards system solvencies in that we expect revenues in kind for each system to be equivalent or more than the annual cost of each system. As an example, we might cite the Federal Aid System, funds for the operation of which derive principally from road user revenue. In practice, we attempt to justify the existence of such a system or section thereof on the premise that the usual relatively higher traffic volumes will consume gasoline in an amount sufficient along with the subsidy from other roads to match Federal funds and thus accumulate revenues great enough to offset the annual cost. This reasoning allows no consideration of the intangible benefits (those relating to social necessity) which attach to the operation of the Federal Aid System. These we know to be present as witness the fact that 28.86% of our rural population is immediately served by the Federal Aid System, i.e. the farms of these residents "front" on a system which affords them a convenient access to market. The influx of out-of-state drivers in recent years can be ascribed to near completion of the Federal Aid System which touches upon or penetrates most of our scenic and recreational areas. It is estimated that these people left millions in the trade channels of Montana in 1936 aside from the funds which they contributed to the Highway Fund as a circumstance of the gasoline license tax levy. If the state were to levy a tax on this "outside" money of 5 mills on the dollar which is entirely commensurate with current practice in the general property tax levy, there would be a considerable sum accruing to the credit of the Federal Aid System and other main secondary routes. This discussion does not mean to suggest the levy of such a tax, it is presented only to show the value of the Federal Aid System in matters generally unrelated to road use. In passing, it might be said that had the Federal Aid System failed to return gasoline license tax revenues in amount sufficient to defray the cost thereof the values attaching to improved trade relationships, community welfare, driving ease, safety, etc., would more than justify an apparent insolvent element in our state economy.

Continued comment respecting the information set forth in Table 89 is as follows. Plates XXXIIIA and XXXIIIB have been prepared to aid in clarification of the detailed computation involved in the preparation of the table.

PLATE XXXIII-A

Comparison of Anticipated Road Revenues and Annual Costs On The Rural Federal Aid System as of 1950

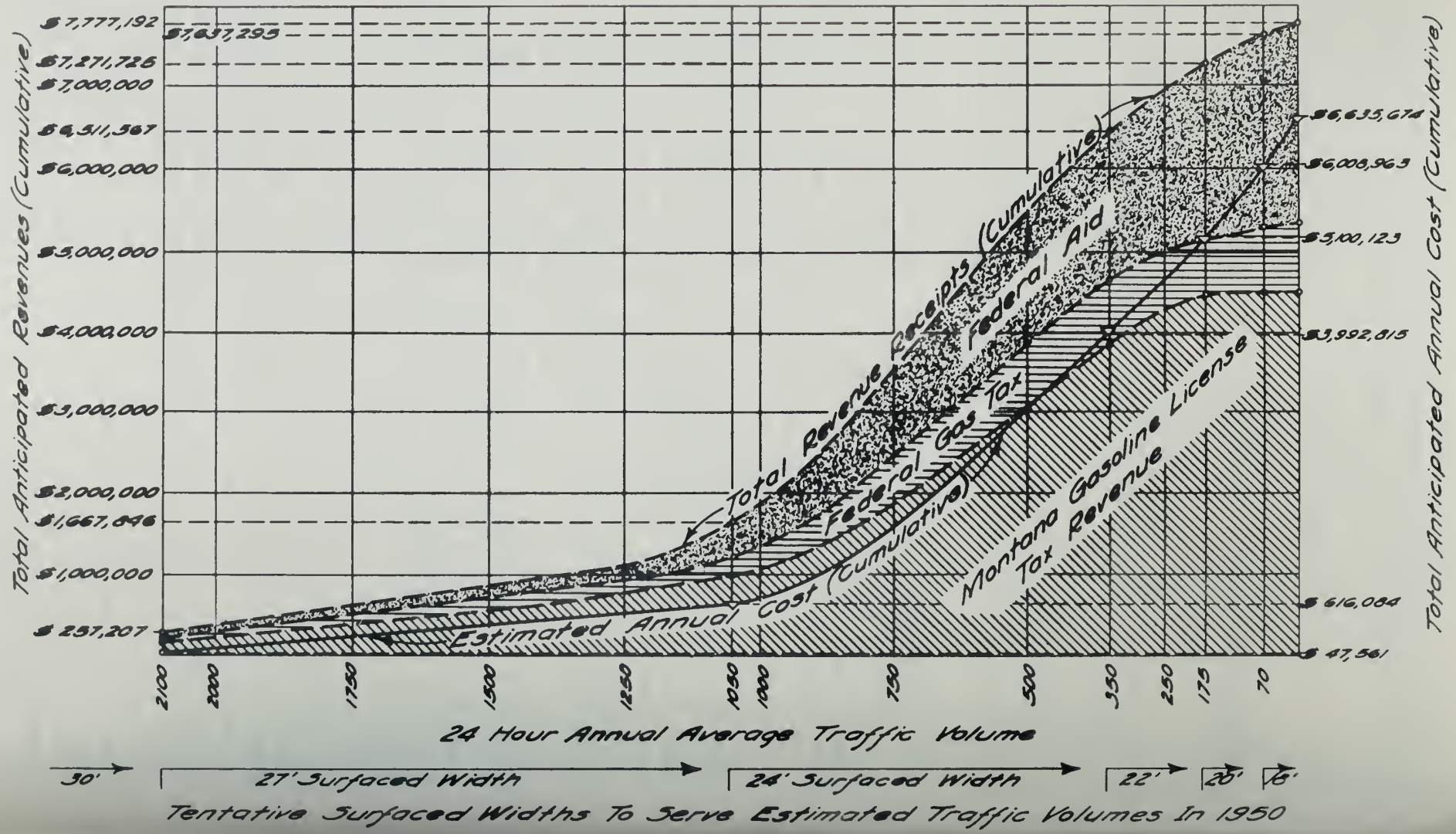
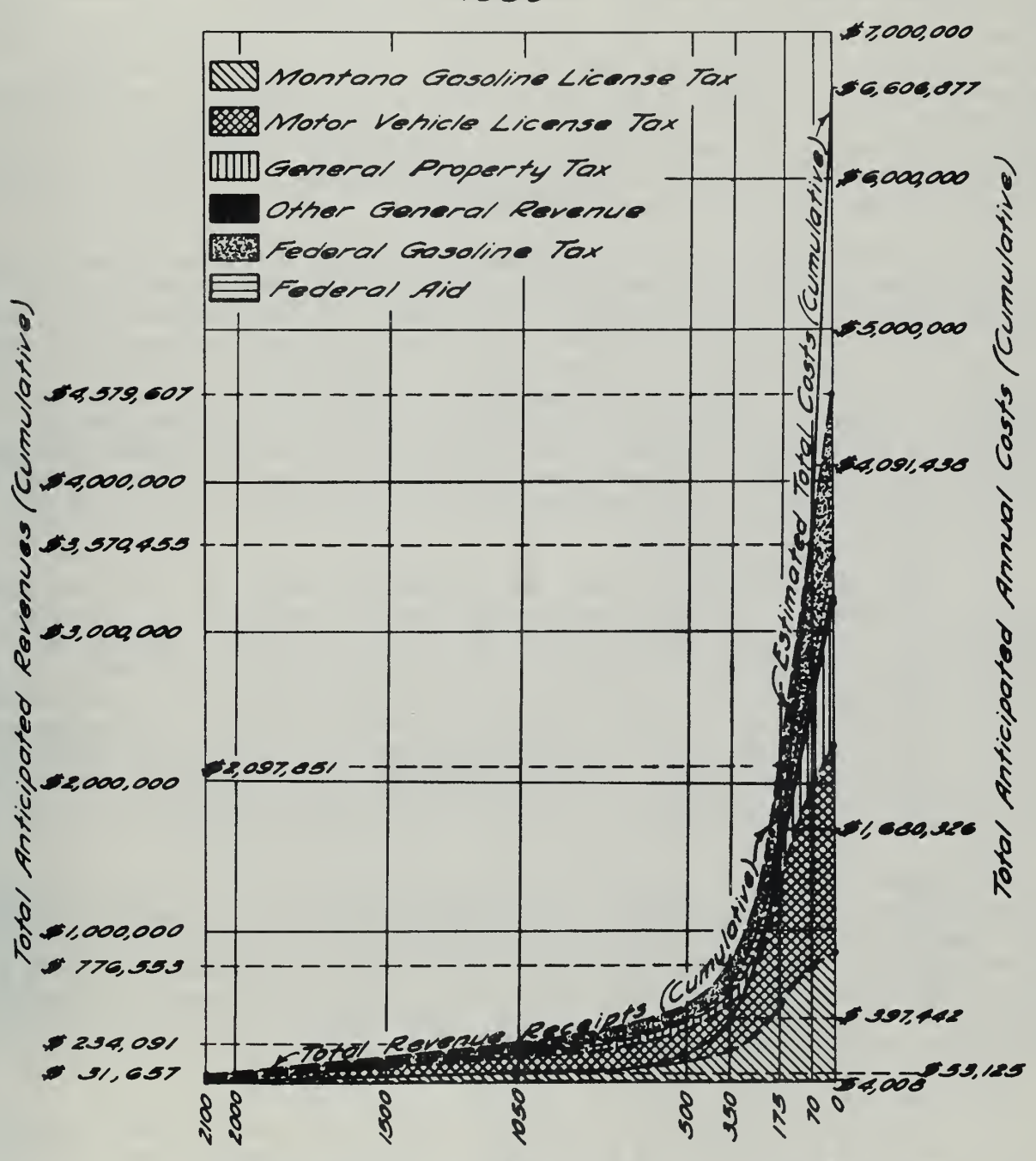


PLATE XXXIII-B

Comparison of Anticipated Road Revenues and Annual Costs on the Rural State Secondary System as of 1950



Tentative Widths To Serve Estimated Traffic Volume As Of 1950

A. Federal Aid System

Assuming Federal allotments to be forthcoming in similar ratio as that now in effect, the revenues which we may expect in 1950 will exceed estimated costs by $1,339,453 ($1,141,518 + $257,935). Federal Aid for construction of the Federal Aid System is now tendered the state in the amount of $2,000,000 per year.

To this we may add about 80% of the usual appropriation for construction of roads in the national reservations, say $550,000, and $500,000 for the construction of grade separation projects. The Federal funds which we may then expect yearly under current administrative procedure will total $3,050,000. According to the estimate of costs set forth in the table, Federal funds necessary for construction of a system such as that contemplated will total $3,499,587 (Federal Gas Tax, $885,671 + $50,339 plus Federal Grants in Aid, $2,463,167 + $100,410). The table thus shows that Federal funds if tendered under administrative controls now in effect, will be lacking in the amount of $450,000.

With respect to Plate XXXIIIA we find the line indicative of total revenue receipts to increase at a faster rate than the line indicative of the estimated annual cost until we reach the traffic volume group (175 - 349). In other words, when we build a road having a surface width of less than 24 feet, we cannot anticipate that revenues will exceed expenditures and roads having a surface width of 24 feet or more in line with design recommendations regarding traffic density, serve to lay up a reserve for expenditure in construction and maintenance of those sections of the system which serve traffic in the lesser volume groups. The point at which anticipated revenues are exceeded by expenditures is estimated to be at a point on the horizontal scale indicative of an average traffic volume of 400 vehicles per day.

B. State Secondary System

The State Secondary System, assuming Federal Grants in Aid to be forthcoming in similar ratio as that now in effect, shows revenues to be exceeded by expenditures in the amount of $2,040,926 ($2,027,270 + $13,656), Federal Aid for the construction of the State Secondary System is now tendered the state in the amount of $500,000. To this fund we may add $150,000 usually appropriated for construction in national reservations to bring the total to $650,000. According to the table, the Federal funds necessary in the construction of a secondary system such as that contemplated will total $1,392,225 (Federal Gas Tax $278,602 + $4,659 plus Federal Grants in Aid, $1,099,654 + $9,310) indicating a shortage under existing administrative procedure of $742,225.

As to Plate XXXIIIB we find again that the line indicative of anticipated revenue increases at a faster rate than the line of annual cost until it reaches the traffic volume group (175-349). Here again, we find that those sections of the system for which we must build widths in excess of 22 feet are supporting and laying up a reserve for mileage having surface widths of 22 feet or less. As set forth specifically in the table, annual costs in whole for rural sections of the State Secondary System will exceed revenues by $2,027,270.

C. The Land Service System

No precise figures can be submitted concerning costs incident to the operation of the Land Service System as of 1950. We do know, however, that extensions of the Federal Aid System and the State Secondary System will replace and retire Land Service System roads which are generally of a higher type surface and serve relatively higher traffic volumes with a resultant higher annual cost in construction-maintenance. By so doing it is reasonable to expect that the funds now spent on these higher type roads will be expended in maintenance of the State Secondary System.

According to the table, these expenditures will leave a balance of $2,993,277 (including $186,437, Federal appropriations) and the cost per mile for 54,240.6 miles would be about $55.00. This cost compares generally with current costs of $77.00 per mile which includes charges incurred in construction-maintenance and debt service.

D. Local Streets and Alleys

Annual costs are here adjudged to be equal to revenues available as of 1950. These costs, totalling $756,361 approximate those now in effect on the city streets and alleys of the state.

E. A State Highway System Comprising the Federal Aid System and the State Secondary System.

Combining the information relating to the Federal Aid System and the State Secondary System, we find anticipated revenues to be $641,473 less than estimated costs as of 1950. Such a result comprehends a program whereby Federal Grants in Aid will be increased by about $1,200,000 per year. As to the estimated deficiency ($641,473) in total revenues it is believed that these funds can be raised as a circumstance of a gross ton-mile tax as outlined in Chapter XIII whereby equalization in road user costs among the several classes of road users is the principal objective.

12.04 Tentative Allocation of Annual Costs Between Road Users and Others As of 1950.

In line with the times, road user revenues are estimated to increase faster than revenues deriving from other sources, principally the general property tax. If again as in Section 12.01 we distribute the road revenues in accord with the origin of such funds by system use or by measuring the service of the systems in terms of population served, we have results as follows:

TABLE 90A
SHOWING ANTICIPATED ALLOCATION OF COSTS BETWEEN ROAD USERS (Motor Vehicles) AND OTHER COMMUNITY INTERESTS IN MONTANA AS OF 1950.

System Designation	Road Revenues Originating in the Interest of Community Welfare, Trade Relationships, Civil Administration, etc. (Social Necessity)					Road Revenues Originating With Road Use						Grand Total All Road Revenues
	General Property Tax Levy	Other General Revenue Receipts	Federal Grants in Aid	Federal Appropriation	Sub-Total	Montana Gasoline License Tax	Motor Vehicle License Tax	Federal Gas Tax	Federal Grants in Aid	Federal Appropriation	Sub-Total	
Federal Aid System												
Rural	$ 866,804	$ 24,862	$ 356,435	$ 388	$1,248,489	$ 309,076	$ 43,496	$ 61,816	$ 123,315		$ 573,105	
State Secondary System						$3,425,220	$ 906,221	$ 685,044	$1,366,595	$ 760	$ 6,348,438	$8,170,032
Rural	677,607	19,416	278,389	4,354	979,168	97,225	13,728	19,445	38,791		180,362	
Land Service System						1,077,458	286,008	215,492	429,884	8,540	2,006,209	3,165,739
	1,472,242	42,227	605,393	58,218	2,178,080	79,081	11,261	15,816	31,552		146,876	
Federal Aid System						876,390	234,622	175,278	349,663	114,177	1,740,964	4,065,920
Urban	47,872	6,643			54,515	17,565	2,489	3,513	7,008		32,600	
State Secondary System						194,662	51,833	38,932	77,666		361,088	448,203
Urban	15,957	2,214			18,171	1,630	230	326	650		3,025	
						18,047	4,809	3,609	7,200		33,476	54,672
Local Streets & Alleys	638,194	88,556			726,750							726,750
All Roads, Streets & Alleys	$3,718,076	$183,920	$1,240,217	$62,960	$5,205,173	$ 504,577	71,204	$ 100,916	$ 201,316			
						$5,591,777	$1,483,513	$1,118,355	$2,231,008	$123,477	$11,426,143	$16,631,316

TABLE 90B

SHOWING ANTICIPATED ALLOCATION OF COSTS BETWEEN ROAD USERS (Motor Vehicles) AND OTHER COMMUNITY INTERESTS IN MONTANA AS OF 1950

System Designation	Mileage	Revenues Originating in Consideration of Social Necessity	Revenues Originating With Road Use	Grand Total All Revenues
Federal Aid System Rural	5719.0	15.28%	84.72%	100.00%
Federal Aid System Urban	150.0	12.16%	87.84%	100.00%
Federal Aid System Rural & Urban	5869.0	15.12%	84.88%	100.00%
State Secondary System, Rural	6700.0	30.93%	69.07%	100.00%
State Secondary System, Urban	50.0	33.24%	66.76%	100.00%
State Secondary System, Rural & Urban	6750.0	30.97%	69.03%	100.00%
Land Service System	54240.6	53.57%	46.43%	100.00%
Land Service System & State Secondary System, Rural	60940.6	43.66%	56.34%	100.00%
Local Streets & Alleys, Urban	1999.7	100.00%		100.00%
All Roads, Streets, & Alleys in Urban Areas	2199.7	65.01%	34.99%	100.00%
All Rural Roads & Streets & Alleys	68859.3	31.30%	68.70%	100.00%

The tables show general agreement with the tables set forth in Section 12.01 of this Chapter. There is, however, a 5% increase in whole as regards the allocation to road users. With respect to the Federal Aid System we find 1.25% increase in the allocation of annual costs to road users and in the allocation of costs to road user on the State Secondary System, rural and urban, we find an increase of 2.16%. The anticipated allocation as of 1950 approaches the average values set forth in Table 87A and 87B.

12.05 **Summary of Conclusions** Summarizing the data set forth in this Chapter we have informative points as follows:

1. Montana's taxing procedure regulates the allocation of costs between road users and others in general accord with the allocations set forth as a result of studies in other states.

2. To construct and maintain a Federal Aid System and a State Secondary System according to the lengths set forth in Chapter IX, it is necessary that Federal Grants in Aid be increased by $1,200,000 yearly.

3. Revenues originating in all probability with road users must be found to offset an apparent deficiency of $642,000 in the construction and maintenance of the State Highway System as proposed.

It is to be remembered that all the data set forth herein relating to annual costs are predicated on the proposition that the road as built as of 1950 will have a thirty year service life. Experience to date would indicate this estimate to be in excess of the actual service life which we may reasonably expect in the future. On a twenty-five year basis the apparent deficiency listed hereinabove would be increased to $1,440,000 and this result would comprehend a situation wherein Federal Grants in Aid would be increased by $2,200,000 over the funds now allotted.

CHAPTER XIII

DISCUSSION OF DISTRIBUTION OF TOTAL MOTOR VEHICLE IMPOSTS AMONG VEHICLES OF VARIOUS CLASSES

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XIII
DISCUSSION OF DISTRIBUTION OF TOTAL MOTOR VEHICLE IMPOSTS AMONG VEHICLES OF VARIOUS CLASSES.

The discussion in Chapter XII, Section 12.01, goes to some great length to show that the effect of the Montana road taxing procedure is generally equitable and in accord with practice in other states. In line with the discussion let us then say that the road revenues originating with the general property tax are a justly correct measure of road services rendered in consideration of social necessity, thus leaving motor vehicle imposts for discussion and analysis as regards equalization. To continue the discussion, let us next consider the gasoline license tax to be equitable when viewed in the light of road use. In support of this conception we cite the fact that trucks and other commercial vehicles being heavier, operate to consume more gas per mile than do the passenger cars with a resultant higher gasoline tax revenue return per vehicle mile. This is as it should be because these vehicles demand wider surfaces stronger road-beds and easier grades than do passenger cars; in other words, were we to build roads solely for passenger cars, our costs would be considerably less. From the viewpoint of ton mileage, we find that trucks and buses operate at a much lower gas tax rate per ton mile than do passenger cars. This we believe to be correct in principle and we support the supposition by comparing the operation of a motor truck to that of a railroad where we find a freight train operating at less cost per ton mile than a passenger train. In line then with the generally accepted scheme of operation in transport, we cannot reasonably expect to impose a tax tending to equalize the gas tax rate per ton mile between gross tonnages involving passenger cars and the usual load of passengers and gross tonnages involving trucks and freight.

The remaining source of revenue originating with road use by motor vehicles is the Motor Vehicle License Tax. For all practical purposes this tax represents a service charge, i.e., we pay a certain tax, according to the classification of vehicle which we own, for the privilege of using the roads and streets in the state. The Motor Vehicle License Tax is graded with a view toward imposing higher rates on the vehicles which will haul the heavier loads, which tends toward equalization in some degree. We find, however, that most of the road users in the state drive not to exceed 10,000 miles per year, others, principally those engaged in the business of highway transport, drive distances far in excess of 10,000 miles per year. Those who drive the lesser distances then pay for the privilege of using the roads at a far greater rate than those who drive the longer distances. We are all willing to pay the initial "service charge" embodied in the Motor Vehicle License Tax but we believe that road use in excess of that mileage represented by the minimum of the service charge should be "metered" and some tax procedure devised to levy on this additional road use. Further, it is believed that this proposed equalization can best be afforded from the standpoint of gross ton mileage, since this idea comprehends road use in its fullest sense. Under this conception we find for example that the passenger car owner pays a license tax for the privilege of using our roads at a rate two times that in effect with respect to trucks and buses.

13.01 Relative Measure of Use of the Several Systems as of 1950

In any study relating to equalization of motor vehicle imposts, we should anticipate conditions as they will exist on completion of the Federal Aid System and the State Secondary System, i.e., as of 1950. Our current tax procedure is generally satisfactory, however, there is an inherent weakness in that it does not recognize a possibility for variance in road use afforded through completion of a comprehensive State Highway System comprising the Federal Aid System and the State Secondary System. Accordingly, from data set forth in Chapter III relating to gross tonnages and from data set forth in Chapter IV treating with the forecast of traffic volume as of 1950, we have prepared Table 91 to show the relative measure of use of the several systems in terms of ton miles.

TABLE 91
ESTIMATED TON MILEAGE GENERATED BY ALL VEHICLES,
LOCAL AND FOREIGN, AS OF 1950

Owned by Residents of -	Vehicle Classification	(000 ton miles) Federal Aid Rural	Federal Aid Urban	State Secondary Rural	State Secondary Urban	Land Service	Local Streets & Alleys	All Roads Streets & Alleys
	Passenger Cars	419,827	11,013	244,676	1,826	176,065	35,143	888,550
	Trucks, Trucks & Trailer Combinations	466,820	10,592	253,041	1,862	291,631	38,914	1,062,860
	School & Passenger Buses	91,674	2,283	32,931	238	16,401	2,208	145,735
	All Trucks, Truck & Treiler Combinations & Buses	558,494	12,875	285,972	2,100	308,032	41,122	1,208,595
Rurel Areae in Montana	All Vehicles	978,321	23,888	530,648	3,926	484,097	76,265	2,097,145
	Passenger Cars	630,518	41,906	101,904	3,783	73,986	137,797	989,894
	Trucks & Truck & Trailer Combinations	322,690	53,159	41,055	4,099	54,317	120,010	615,330
	School & Passenger Busee	35,678	5,979	4,059	413	2,292	5,998	54,419
	All Trucks, Truck & Treiler Combinations & Buses	358,368	59,138	45,114	4,512	56,609	146,008	669,749
Urban Areas in Montana	All Vehicles	988,886	101,044	147,018	8,295	130,595	283,805	1,659,643
	Passenger Cars-	1,050,345	52,919	346,580	5,609	250,051	172,940	1,878,444
	Trucks & Truck & Treiler Combinations	789,510	63,751	294,096	5,961	345,948	178,924	1,678,190
	School & Passenger Buses	127,352	8,262	36,990	651	18,693	8,206	200,154
	All Trucks, Truck & Treiler Combinations and Buses	916,862	72,013	331,086	6,612	364,641	187,130	1,878,344
Montana	All Vehicles	1,967,207	124,932	677,666	12,221	614,692	360,070	3,756,788
	Passenger Cars	310,519	14,208	44,462	574	6,935	1,207	377,905
	Trucks & Truck & Treiler Combinations	42,634	1,848	8,715	130	1,668	318	55,313
	School & Pessenger Buses	1,793	77	331	6	27	15	2,249
	All Trucks, Truck & Treiler Combinations & Buses	44,427	1,925	9,046	136	1,695	333	57,562
Other States	All Vehicles	354,946	16,133	53,508	710	8,630	1,540	435,467
	Passenger Cars	1,360,864	67,127	391,042	6,153	256,986	174,147	2,256,349
	Trucks & Truck & Treiler Combinations	832,144	65,599	302,811	6,091	347,616	179,242	1,733,503
	School & Pessenger Buses	129,145	8,339	37,321	657	18,720	8,221	202,403
	All Trucks, Truck & Trailer Combinations & Buses	961,289	73,938	340,132	6,748	366,336	187,463	1,935,906
Montana and Other Stetes	All Vehicles	2,322,153	141,065	731,174	12,901	623,322	361,610	4,192,255

Generally significant data deriving from the tabulations are as follows:

1. Passenger cars, comprising about 73.5% of the total registrations will generate 50% of the total ton mileage generated by Montana residents.

2. Montana state owners of passenger cars will generate approximately 83% of all passenger car ton mileage generated on the road system in whole.

3. Sixty and three-tenths percent of all passenger car ton mileage will be generated on the rural Federal Aid System.

4. Approximately 81% of all passenger car ton mileage will be generated on the Federal Aid and Secondary Systems in combination.

5. Montana state owners of trucks, trailers, buses, etc. will generate about 97% of the total truck and bus ton mileage.

6. Forty-nine and seven-tenths percent of the total truck and bus mileage will be generated on the rural Federal Aid System.

7. Approximately 71.4% of all truck ton mileage will be generated on the Federal Aid System and the Secondary System in combination.

13.02 Allocation of Costs in Relation to System Use by Montana Residents

Diverging for the moment from the general intent of equalization, we will now allocate costs in relation to system use by Montana residents. The ton-mile factor bears a direct relationship in matters of construction and maintenance along our several systems since the costs therefor are dependent in great measure on the design of the subgrade. Given a road which we know will be called on to serve heavy commercial traffic, the designer must provide an adequately reinforced subgrade with a resultant increase in cost. These data, deriving from Table 91 are as follows:

1/ Percent of Road System in whole.
2/ Percent of System Designation.

TABLE 92
ALLOCATION OF COSTS IN RELATION TO SYSTEM USE BY MONTANA RESIDENTS AS OF 1950

Owned by Residents of -	Vehicle Classification	Federal Aid Rural		Federal Aid Urban		Secondary Rural		Secondary Urban		Land Service		Local Streets		All Road Mileage	
		1/	2/	1/	2/	1/	2/	1/	2/	1/	2/	1/	2/	1/	2/
Rural Areas in Montana	Passenger Cars	11.18	20.08	0.29	0.52	6.51	35.46	0.04	0.22	4.69	18.07	0.94	3.62	23.65	23.65
	Trucks & Truck & Trailer Combinations	12.41	22.28	0.28	0.50	6.74	36.71	0.06	0.33	7.76	29.90	1.04	4.01	28.29	28.29
	School & Passenger Buses	2.45	4.40	0.06	0.11	0.88	4.79	0.00	0.00	0.44	1.70	0.05	0.19	3.88	3.88
	Trucks, Truck & Trailer Combinations & Buses	14.86	26.68	0.34	0.61	7.62	41.50	0.06	0.33	8.20	31.60	1.09	4.20	32.17	32.17
	All Vehicles	26.04	46.76	0.63	1.13	14.13	76.96	0.10	0.55	12.89	49.67	2.03	7.82	55.82	55.82
Urban Areas in Montana	Passenger Cars	16.78	30.13	1.12	2.01	2.71	14.76	0.10	0.54	1.97	7.59	3.67	14.15	26.35	26.35
	Trucks & Truck & Trailer Combinations	8.59	15.42	1.41	2.57	1.09	5.94	0.11	0.60	1.45	5.59	3.73	14.37	16.38	16.38
	School & Passenger Buses	0.95	1.71	0.17	0.31	0.11	0.60	0.01	0.05	0.06	0.23	0.15	0.58	1.45	1.45
	Trucks, Truck & Trailer Combinations & Buses	9.54	17.13	1.58	2.84	1.20	6.54	0.12	0.65	1.51	5.82	3.86	14.95	17.83	17.83
	All Vehicles	26.32	47.26	2.70	4.85	3.91	21.30	0.22	1.19	3.48	13.41	7.55	29.10	44.18	44.18
Montana	Passenger Cars	27.96	50.21	1.41	2.53	9.22	50.22	0.14	0.76	6.66	25.66	4.61	17.77	50.00	50.00
	Trucks & Truck & Trailer Combinations	21.00	37.70	1.69	3.03	7.83	42.65	0.17	0.93	9.21	35.49	4.77	18.38	44.67	44.67
	School Buses & Passangar Buses	3.40	6.11	0.23	0.42	0.99	5.39	0.01	0.05	0.50	1.93	0.20	0.77	5.33	5.33
	Trucks, Truck & Trailer Combinations & Buses	24.40	43.81	1.92	3.45	8.82	48.04	0.18	0.98	9.71	37.42	4.97	19.15	50.00	50.00
	All Vehicles	52.36	94.02	3.33	5.98	18.04	98.26	0.32	1.74	16.37	63.08	9.58	36.92	100.00	100.00

The tabulation leads to conclusions as follows:

A. Federal Aid System, Montana Owners

Approximately 55.7% of all Montana road user revenues should be expended on the Federal Aid System to maintain a fair relationship between road use and revenues. Of this total, 52.7% should derive from passenger car owners and the balance from trucks, tractor trucks, trucks with trailers and buses.

B. State Secondary System, Montana Owners

Approximately 18.4% of all local road user revenues should be expended on the State Secondary System to maintain a fair relationship between road use and revenues. Of this total, 51.0% should derive from passenger car owners. In combination, the Federal Aid System and the State Secondary System should receive approximately 74.0% of all road user revenues of which total, 52.3% derive from passenger car owners.

C. Land Service System, Montana Owners

Approximately 16.4% of all local road user revenues should accrue to the credit of the Land Service System, of which 40.7% should derive from passenger car owners.

D. Local Streets & Alleys, Montana Owners

Approximately 9.6% of all local road user revenues should accrue to the credit of local streets of which 48.1% should derive from passenger car owners.

13.03--Synthesis of Special Taxes to Equalize Annual Costs of the Highway Systems.

By comparison of the data set forth in Tables 91 and 92 and anticipated revenues as set forth in Chapter XII we find, generally speaking, that our contemporary road tax procedure operates in prejudice of passenger car owners when interpreted in terms of ton mileage. Fox example, it is estimated that passenger car owners will pay a motor vehicle license tax of $990,942; these owners will generate a total of 1,878,444,000 ton miles; accordingly the rate per ton mile will be $0.00053. On the other hand, truck and bus owners will pay a total of $490,420; these owners will generate a total of 1,878,344,00 ton miles; accordingly, the rate per ton mile will be $0.00025 or 49.5% of the rate in effect with respect to passenger car owners. To show the full extent of this prejudice as it affects the various classes of vehicles and as it affects the allocation of costs for each of the several systems, we have prepared Table 93 as follows. Those data set forth as "Estimated Revenue" represent the revenue returns for each vehicle type according to the rate in effect for the state as a whole, for the type of vehicle in the classification. "Equalized Revenue" represents an estimated revenue return according to the rate in effect with respect to the total number of vehicles.

TABLE 93
COMPARISON OF ESTIMATED MOTOR VEHICLE LICENSE TAX REVENUE AND REVENUE EQUALIZED ON BASIS OF ROAD USE IN TERMS OF TON MILEAGE AS FORECAST IN 1950.

Ownad by Residents of -	Vehicla Classification	Classification of Ravenua and Equalized Ravenue	Fadaral Aid Rural	Federal Aid Urban	State Secondary Rural	State Secondary Urban	Land Service System	Local Streets & Alleys	All Road Milaaga
Rurel Arees in Montana	Passangar Cers	Estimatad Revenue	$227,898	$ 5,978	$132,820	$ 991	$ 95,575	$ 19,077	$ 482,339
		Equelized Revanua	165,785	4,349	96,620	721	69,526	13,877	350,878
	Trucks and Truck & Trailer Combinations	Estimatad Ravanua	134,802	3,059	73,070	538	84,213	11,237	306,919
		Equalizad Revanua	184,342	4,183	99,923	735	115,162	15,367	419,712
	School and Passangar Buses	Estimatad Revenua	13,551	337	4,868	35	2,424	327	21,542
		Equalized Ravanua	36,201	902	13,004	94	6,477	871	57,549
	All Vahicles	Estimated Ravanua	376,251	9,374	210,758	1,564	182,212	30,641	810,800
		Equalized Ravanua	386,328	9,434	209,547	1,550	191,165	30,116	828,139
Urban Areas in Montana	Passangar Cers	Estimatad Revenue	325,177	21,612	52,555	1,951	38,157	71,066	510,518
		Equalized Ravenua	248,985	16,548	40,241	1,494	29,216	54,414	390,098
	Trucks and Truck & Trailer Combinations	Estimated Ravanua	82,351	13,566	10,477	1,046	13,862	35,731	157,033
		Equalizad Ravanua	127,427	20,992	16,212	1,619	21,449	55,288	242,987
	School and Passangar Busas	Estimatad Revanue	3,364	567	385	39	217	570	5,162
		Equalizad Ravanua	14,089	2,361	1,603	163	905	2,368	21,469
	All Vahiclas	Estimatad Revenue	410,912	35,745	63,417	3,036	52,236	107,367	672,713
		Equalized Ravanua	390,501	39,901	58,056	3,276	51,570	112,070	655,374
All Arees of Montana	Passangar Cars	Estimatad Ravanua	553,075	27,590	185,375	2,942	133,732	90,143	992,857
		Equalized Revenue	414,770	20,897	136,861	2,215	98,742	68,291	741,776
	Trucks and Truck & Trailer Combinations	Estimatad Ravanue	217,153	16,625	83,547	1,584	98,075	46,968	463,952
		Equalized Revenue	311,769	25,175	116,135	2,354	136,611	70,655	662,699
	School and Passangar Busas	Estimatad Revenue	16,935	904	5,253	74	2,641	897	26,704
		Equalized Revenue	50,290	3,263	14,607	257	7,382	3,239	79,038
	All Vahiclas	Estimated Ravanue	787,163	45,119	274,175	4,600	234,448	138,008	1,483,513
		Equalized Revenue	776,829	49,335	267,603	4,826	242,735	142,185	1,483,513

These data show that passenger cars will pay 66.9% of all motor vehicle license tax revenues originating with Montana residents, although as shown in Table 91 the passenger car movements will comprehend but 50% of the total ton mileage. This means that passenger cars will pay the tax on a ton mileage basis at a rate twice that of trucks and buses. The table is nothing more than a statement of what the several vehicle type classifications will pay and what they should pay if the motor vehicle license tax were reduced to an equivalent ton mileage tax in consideration of the privilege of using the highways of the state. Under these conditions we find that passenger cars will have made an overpayment of $251,081 ($992,857 - $741,776) and trucks and buses will have made a corresponding under payment in the amount of $251,081- ($662,699 - $463,952) + ($79,038 - $26,704).

If on the other hand, we were to levy a ton mileage tax on all traffic at the rate in evidence with respect to passenger cars, we would find that trucks and buses should pay $992,804 or approximately $502,000 in excess of what they will pay under the limitations of the present motor vehicle license tax.

On checking the distribution of annual travel distances, characteristic of truck owners, we find that those units which travel less than 10,000 miles per year, pay at a rate approaching that in effect with respect to passenger cars. It is characteristic of private truck owners to drive not to exceed 10,000 miles per year, it

is found also that most common carriers and contract haulers engaged in commercial haul, travel considerably in excess of 10,000 miles per year, hence these latter owners haul at a rate far less than is generally equitable. Tables 94A, 94B, 94C, and 94D as follow present information respecting the distribution of travel distances as forecast for 1950. These data are based on the findings of the Road Use Survey and the Traffic Survey, insofar as they are applicable with respect to a forecast of 1950 traffic.

1/ No of Units as Specified in "Vehicle Type" Column.
2/ Estimated Revenue Origineting With each Vehicle Type as Specified.
3/ Estimated Revenue if Motor Vehicle License Tax Were Paid on a Ton Mile Basis Equivelent to that in Effect With Respect to Passenger Cars.

TABLE 94A
SHOWING FORECASTED DISTRIBUTION OF RURAL OWNED TRUCK AND BUS REGISTRATION, ESTIMATED MOTOR VEHICLE LICENSE TAX REVENUE, AND EQUALIZED REVENUE AS OF 1950.

Rated Capacity	Vehicle Types	Annual Travel Distance Groups											
		0 - 4999			5000 - 9999			10,000 - 14,999			15,000 - 19,999		
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
One ton or less	Single Unit Trucks	9,837	$ 40,052	$23,202	4,060	$16,531	$ 28,728	1,508	$ 6,140	$ 17,785	481	$ 1,958	$ 7,942
	Tractor Trucks & Semi-trailers	14	80	58	5	28	62	2	11	41	1	6	30
	Trucks with Full Trailers	34	194	215	14	80	265	5	28	158	2	11	88
	School or Passenger Buses	27	158	135	18	105	271	15	88	376	11	64	366
	All Trucks, Trailers & Buses	9,912	$ 40,484	$23,610	4,097	$16,744	$ 29,326	1,530	$ 6,267	$ 18,360	495	$ 2,039	$ 8,446
Over one ton including 1½ tons	Single Unit Trucks	9,546	$ 77,734	$49,617	5,277	$42,971	$ 82,284	2,826	$23,012	$ 73,143	1,364	$11,107	$49,627
	Tractor Trucks & Semi-trailers	137	1,674	1,398	76	928	2,327	40	489	2,041	19	232	1,357
	Trucks with Full Trailers	97	1,185	973	54	660	1,624	28	342	1,404	13	159	913
	School or Pessenger Buses	22	257	140	15	175	285	14	164	443	11	129	488
	All Trucks, Treilers & Buses	9,802	$ 80,850	$52,128	5,422	$44,734	$ 86,520	2,908	$24,007	$ 77,331	1,407	$11,627	$ 52,385
Over 1½ tons including 2 tons	Single Unit Trucks	78	$ 1,429	$ 567	60	$ 1,099	$ 1,308	47	$ 861	$ 1,708	35	$ 641	$ 1,780
	Tractor Trucks & Semi-treilers	15	336	172	10	224	343	6	134	343	6	134	480
	Trucks with Full Trailers	7	157	103	5	112	222	3	67	221	3	67	310
	School or Pessenger Buses	9	237	69	9	237	207	9	237	345	9	237	483
	All Trucks, Treilers & Buses	109	$ 2,159	$ 911	84	$ 1,672	$ 2,080	65	$ 1,299	$ 2,617	53	$ 1,079	$ 3,053
Over 2 tons and less than 3 tons	Single Unit Trucks	78	$ 2,382	$ 656	60	$ 1,832	$ 1,514	47	$ 1,435	$ 1,977	36	$ 1,099	$ 2,120
	Tractor Trucks & Semi-trailers	15	519	198	10	346	397	6	208	397	6	208	556
	Trucks with Full Trailers	7	242	120	4	139	205	3	104	256	3	104	359
	School or Passenger Buses	5	219	45	6	263	162	5	219	224	6	263	377
	All Trucks, Treilers & Buses	105	$ 3,362	$ 1,019	80	$ 2,580	$ 2,278	61	$ 1,966	$ 2,854	51	$ 1,674	$ 3,412
Three tons and over and less than 5 tons	Single Unit Trucks	0	$ 0	$ 0	1	$ 49	$ 32	2	$ 98	$ 107	2	$ 98	$ 150
	Trsctor Trucks & Semi-trailers	13	688	186	13	688	558	14	741	1,002	13	688	1,302
	Trucks with Full Treilers	10	529	223	9	476	601	10	529	1,112	9	476	1,401
	School or Passenger Buses	4	280	41	4	281	124	4	280	206	4	281	288
	All Trucks, Treilers & Buses	27	$ 1,497	$ 450	27	$ 1,494	$ 1,315	30	$ 1,648	$ 2,427	28	$ 1,543	$ 3,141
Five tons & over	Single Unit Trucks	4	$ 651	$ 52	3	$ 489	$ 117	4	$ 651	$ 261	3	$ 489	$ 274
	Tractor Trucks & Semi-trailers	6	1,001	95	6	1,002	284	7	1,169	552	6	1,001	662
	Trucks with Full Treilar	2	334	56	1	167	84	2	334	280	2	334	391
	School or Pessenger Buses												
	All Trucks, Trailers & Buses	12	$ 1,986	$ 203	10	$ 1,658	$ 485	13	$ 2,154	$ 1,093	11	$ 1,824	$ 1,327
All Rated Capacities	All Trucks, Truck end Treiler Combinations end Buses	19,967	$130,338	$78,321	9,720	$68,882	$122,004	4,607	$37,341	$104,682	2,045	$19,786	$71,764

TABLE 94 A (Continued)

Rated Capacity	Vehicle Types	Annual Travel Distance Groups									Totals		
		20,000 - 24,999			25,000 - 29,999			30,000 & Over					
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
One ton or less	Single Unit Trucks	128	$ 521	$ 2,717	16	$ 65	$ 415	17	$ 70	$ 521	16,047	$ 65,337	$ 81,310
	Tractor Trucks & Semi-trailers										22	125	191
	Trucks with Full Trailers	1	6	56							56	319	782
	School or Passenger Buses	8	47	361	7	41	386	50	292	4,959	136	795	6,674
	All Trucks, Treilers & Buses	137	$ 574	$ 3,134	23	$ 106	$ 801	67	$ 362	$ 5,480	16,261	$ 66,576	$ 89,157
Over one ton including 1½ tons	Single Unit Trucks	573	$ 4,666	$26,804	99	$ 806	$ 5,660	79	$ 645	$ 5,379	19,764	$160,941	$292,814
	Tractor Trucks & Semi-trailers	8	98	735	1	12	112	2	24	254	283	3,457	8,224
	Trucks with Full Trailers	6	73	542	1	12	109				199	2,431	5,565
	School or Pessenger Buses	8	94	456	5	58	349	61	714	8,079	136	1,591	10,240
	All Trucks, Treilers & Buses	595	$ 4,931	$28,537	106	$ 888	$ 6,230	142	$ 1,383	$ 13,712	20,382	$168,420	$316,843
Over 1½ tons including 2 tons	Single Unit Trucks	25	$ 458	$ 1,635	17	$ 312	$ 1,359	16	$ 294	$ 1,607	278	$ 5,094	$ 9,961
	Trsctor Trucks & Semi-trailers	3	67	309	2	45	251	1	22	155	43	962	2,053
	Trucks with Full Trailers	1	22	133	1	23	163	1	23	183	21	471	1,335
	School or Pessenger Buses	9	238	620	9	237	758	82	2,156	12,268	136	3,579	14,750
	All Trucks, Treilers & Buses	38	$ 785	$ 2,697	29	$ 617	$ 2,531	100	$ 2,495	$ 14,213	478	$ 10,106	$ 28,102
Over 2 tons and less than 3 tons	Single Unit Trucks	25	$ 763	$ 1,893	17	$ 519	$ 1,573	17	$ 520	$ 1,975	280	$ 8,550	$ 11,708
	Trsctor Trucks & Semi-trailers	3	104	357	2	69	291	1	34	180	43	1,488	2,376
	Trucks with Full Trailers	1	34	54	1	35	187				19	658	1,281
	School or Pessenger Buses	5	219	404	6	263	593	103	4,518	17,878	136	5,964	19,683
	All Trucks, Treilers & Buses	34	$ 1,120	$ 2,808	26	$ 886	$ 2,644	121	$ 5,072	$ 20,033	478	$ 16,660	$ 35,048
Three tons and over and less then 5 tons	Single Unit Trucks	4	$ 195	$ 386	4	$ 196	$ 471	27	$ 1,318	$ 4,928	40	$ 1,954	$ 6,074
	Trsctor Trucks & Semi-trailers	13	688	1,674	11	582	1,732	43	2,277	9,842	120	6,352	16,296
	Trucks with Full Trailers	10	529	2,002	8	423	1,957	30	1,590	10,663	86	4,552	17,959
	School or Pessenger Buses	4	280	371	4	281	453	113	7,930	23,999	137	9,613	25,482
	All Trucks, Treilers & Buses	31	$ 1,692	$ 4,433	27	$1,482	$ 4,613	213	$13,115	$ 49,432	383	$ 22,471	$ 65,611
Five tons & Over	Single Unit Trucks	4	$ 651	$ 469	4	$ 651	$ 573	62	$10,098	$ 23,809	84	$ 13,680	$ 25,555
	Tractor Trucks & Semi-trailers	6	1,002	851	6	1,002	1,041	107	17,861	49,433	144	24,038	52,918
	Trucks with Full Trailers	1	167	252	2	334	615	29	4,840	23,694	39	6,510	25,372
	School or Passenger Buses												
	All Trucks, Treilers & Buses	11	$ 1,820	$ 1,572	12	$1,987	$ 2,229	198	$32,799	$ 96,936	267	$ 44,228	$103,845
All Rated Capacities	All Trucks, Truck & Trailer Combinations end Buses	846	$10,922	$43,181	223	$5,966	$19,048	841	$55,226	$199,806	38,249	$328,461	$638,806

1/ No of Units as Specified in "Vehicle Type" Column.
2/ Estimated Revenue Originating With Each Vehicle Type as Specified.
3/ Estimated Revenue if Motor Vehicle License Tax Were Paid on a Ton Mile Basis Equivalent to that in Effect With Respect to Passenger Cars.

TABLE 94B
SHOWING FORECASTED DISTRIBUTION OF URBAN OWNED TRUCK AND BUS REGISTRATION, ESTIMATED MOTOR VEHICLE LICENSE TAX REVENUE AND EQUALIZED REVENUE AS OF 1950.

Rated Capacity	Vehicle Types	Annual Travel Distance Groups: 0 - 4999			5000 - 9999			10,000 - 14,999			15,000 - 19,999		
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
One ton or less	Single Unit Trucks	3,853	$17,675	$ 9,088	1,898	$ 8,706	$13,430	917	$ 4,206	$10,814	351	$ 1,610	$ 5,795
	Tractor Trucks & Semi-trailers	6	39	25	3	19	37	1	6	21	1	7	29
	Trucks with Full Trailers	14	90	88	6	39	114	3	19	95	2	13	88
	School or Passengar Buses	6	21	30	7	24	105	6	21	150	6	21	211
	All Trucks, Trailers & Buses	3,879	$17,825	$ 9,231	1,914	$ 8,788	$13,686	927	$ 4,252	$11,080	360	$ 1,651	$ 6,123
Over one ton including 1½ tons	Single Unit Trucks	2,512	$23,046	$13,057	1,620	$14,663	$25,261	985	$ 9,037	$25,598	554	$ 5,083	$20,157
	Tractor Trucks & Semi-trailers	55	757	561	35	482	1,072	22	303	1,123	12	165	857
	Trucks with Full Trailers	35	462	361	22	303	662	14	193	702	7	96	491
	School or Passenger Buses	5	35	32	3	35	95	5	35	158	6	42	266
	All Trucks, Trailers & Buses	2,607	$24,320	$14,001	1,682	$15,683	$27,090	1,026	$ 9,568	$27,581	579	$ 5,386	$21,771
Over 1½ tons including 2 tons	Single Unit Trucks	141	$ 2,911	$ 1,025	96	$ 1,982	$ 2,093	85	$ 1,754	$ 3,089	73	$ 1,507	$ 3,714
	Tractor Trucks & Semi-trailers	5	127	57	5	126	172	3	76	171	3	75	240
	Trucks with Full Trailers	3	76	44	2	50	89	1	26	74	1	25	103
	School or Passenger Buses	4	63	31	5	79	115	4	62	153	4	63	214
	All Trucks, Treilere & Buses	153	$ 3,177	$ 1,157	108	$ 2,237	$ 2,469	93	$ 1,918	$ 3,487	81	$ 1,670	$ 4,271
Over 2 tons end less than 3 tons	Single Unit Trucks	141	$ 4,851	$ 1,186	96	$ 3,303	$ 2,123	85	$ 2,924	$ 3,576	73	$ 2,512	$ 4,299
	Tractor Trucks & Semi-trailers	5	195	66	5	195	198	3	117	198	3	117	278
	Trucks with Full Trailers	3	117	51	2	78	103	1	39	85	1	39	120
	School or Passanger Buses	4	104	36	4	104	108	3	79	135	4	105	251
	All Trucks, Trailers & Buses	153	$ 5,267	$ 1,339	107	$ 3,680	$ 2,832	92	$ 3,159	$ 3,994	81	$ 2,773	$ 4,946
Three tons end over and less than 5 tons	Single Unit Trucks	14	$ 771	$ 150	13	$ 716	$ 418	14	$ 770	$ 750	13	$ 715	$ 975
	Tractor Trucks & Semi-trailers	4	239	57	1	60	43	2	119	143	4	239	401
	Trucks with Full Trailers	3	179	67	1	60	67	1	59	111	2	119	311
	School or Passenger Buses	3	125	31	3	125	155	4	167	206	3	125	216
	All Trucks, Treilers & Busas	24	$ 1,314	$ 305	18	$ 961	$ 683	21	$ 1,115	$ 1,210	22	$ 1,198	$ 1,903
Five tons & over	Single Unit Trucks	1	$ 188	$ 16	1	$ 188	$ 47	1	$ 188	$ 79	1	$ 188	$ 110
	Tractor Trucks & Semi-trailers							1	188	140			
	Trucks with Full Trailers												
	School or Passenger Buses												
	All Trucks, Treilers & Buses	1	$ 188	$ 16	1	$ 188	$ 47	2	$ 376	$ 219	1	$ 188	$ 110
All Rated Capacities	All Trucks, Truck & Treiler Combinations and Buses	6,817	$52,091	$26,049	3,830	$31,537	$46,807	2,161	$20,388	$47,571	1,124	$12,866	$39,126

TABLE 94B (Continued)

Rated Capacity	Vehicle Types	Annual Travel Distance Groups: 20,000 - 24,999			25,000 - 29,999			30,000 & Over			Totals		
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
One ton or less	Single Unit Trucks	114	$ 523	$ 2,420	21	$ 96	$ 545	7	$ 33	$ 202	7,161	$ 32,849	$ 42,294
	Tractor Trucks & Semi-trailers										11	71	112
	Trucks with Full Trailers										25	161	385
	School or Passenger Buses	6	21	271	7	24	386	18	63	1,345	56	195	2,498
	All Trucks, Treilers & Buses	120	$ 544	$ 2,691	28	$ 120	$ 931	25	$ 96	$ 1,547	7,253	$ 33,276	$ 45,289
Over ons ton including 1½ tons	Single Unit Trucks	289	$ 2,651	$13,519	166	$1,523	$ 9,491	32	$ 293	$ 2,701	6,158	$ 56,496	$109,784
	Tractor Trucks & Semi-trailers	6	83	551	3	40	337	1	14	139	134	1,844	4,640
	Trucks with Full Trailers	4	55	361	2	28	221	1	13	132	85	1,170	2,920
	School or Passanger Buses	5	35	285	5	35	349	25	173	2,680	56	390	3,865
	All Trucks, Trailers & Buses	304	$ 2,824	$14,716	176	$1,626	$10,398	59	$ 493	$ 5,652	6,433	$ 57,900	$121,209
Over 1½ tons including 2 tons	Single Unit Trucks	62	$ 1,280	$ 4,055	49	$1,011	$ 3,917	82	$ 1,693	$ 8,656	588	$ 12,138	$ 26,549
	Tractor Trucks & Semi-trailers	2	50	206	1	26	126	1	24	173	20	504	1,145
	Trucks with Full Trailers	1	26	133				1	25	195	9	228	638
	School or Passenger Buses	4	62	276	5	78	421	29	454	4,223	55	861	5,433
	All Trucks, Trailers & Buses	69	$ 1,418	$ 4,670	55	$1,115	$ 4,464	113	$ 2,196	$ 13,247	672	$ 13,731	$ 33,765
Over 2 tons and less than 3 tons	Single Unit Trucks	62	$ 2,133	$ 4,695	49	$1,685	$ 4,535	81	$ 2,788	$ 9,858	587	$ 20,194	$ 30,572
	Tractor Trucks & Semi-trailers	2	78	238	1	39	146	1	39	202	20	760	1,326
	Trucks with Full Trailers							1	40	376	8	313	735
	School or Passenger Buses	4	104	323	4	104	395	33	861	6,243	56	1,461	7,491
	All Trucks, Trailers & Buses	68	$ 2,315	$ 5,256	54	$1,828	$ 5,076	116	$ 3,728	$ 16,679	671	$ 22,750	$ 40,124
Three tons end over and less then 5 tons	Single Unit Trucks	14	$ 770	$ 1,349	13	$ 716	$ 1,531	251	$13,817	$ 60,157	332	$ 18,275	$ 65,330
	Tractor Trucks & Semi-trailers	4	238	515	6	358	945	33	1,967	7,219	54	3,220	9,323
	Trucks with Full Trailers	4	239	801	3	179	734	23	1,371	7,816	37	2,206	9,907
	School or Passenger Buses	3	125	278	3	126	340	35	1,462	8,251	54	2,255	9,477
	All Trucks, Trailers & Buses	25	$ 1,372	$ 2,943	25	$1,379	$ 3,550	342	$18,617	$ 83,443	477	$ 25,956	$ 94,037
Five tons & Over	Single Unit Trucks												
	Tractor Trucks & Semi-trailers				1	$ 188	$ 173	22	$ 4,138	$ 12,639	27	$ 5,078	$ 13,064
	Trucks with Full Trailers				1	188	307	6	1,128	6,063	8	1,504	6,510
	School or Passenger Buses												
	All Trucks, Trailers & Buses				2	$ 376	$ 480	28	$ 5,266	$ 18,702	35	$ 6,582	$ 19,574
All Rated Capacities	All Trucks, Truck & Treiler Combinations and Buses	846	$ 8,473	$30,276	340	$6,144	$24,899	683	$30,396	$139,270	15,541	$162,195	$353,998

1/ No of Units as Specified in "Vehicle Type" Column.
2/ Estimated Revenue Originating With Each Vehicle Type as Specified.
3/ Estimated Revenue if Motor Vehicle License Tax Were Paid on a Ton Mile Basis Equivalent to that in Effect With Respect to Passenger Cars.

TABLE 94 C
SHOWING FORECASTED DISTRIBUTION OF ALL MONTANA OWNED TRUCK AND BUS REGISTRATION, ESTIMATED MOTOR VEHICLE LICENSE TAX REVENUE AND EQUALIZED REVENUE AS OF 1950.

Rated Capacity	Vehicle Types	Annual Travel Distance Groups														
		0 - 4999			5000 - 9999			Under 10,000			10,000 - 14,999			15,000 - 19,999		
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
	Single Unit Trucks & Buses	26,293	$173,001	$ 99,190	13,260	$ 93,969	$159,235	39,553	$266,970	$258,425	6,589	$52,240	$141,504	3,049	$28,149	$100,013
	Tractor Truck & Semi-trailer Combinations	276	5,843	2,889	170	4,286	5,540	446	10,129	8,429	107	3,501	6,111	75	3,060	6,302
	Truck and Full Trailer Combinations	215	3,585	2,291	120	2,164	4,036	335	5,749	6,327	72	1,926	4,636	45	1,443	4,575
All Rated Capacities	All Trucks, Truck & Trailer Combinations & Buses	26,784	$182,429	$104,370	13,550	$100,419	$168,811	40,334	$282,848	$273,181	6,768	$57,729	$152,253	3,169	$32,652	$110,890

TABLE 94 C (Continued)

Rated Capacity	Vehicle Types	Annual Travel Distance Groups												Totals		
		20,000 - 24,999			25,000 - 29,999			10,000 - 29,999			30,000 and Over					
		1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/	1/	2/	3/
	Single Unit Trucks & Buses	1,356	$ 15,836	$ 63,587	510	$ 8,827	$ 34,500	11,504	$105,052	$339,604	1,220	$50,192	$209,718	52,277	$422,214	$807,747
	Tractor Truck & Semi-trailer Combinations	47	2,408	5,436	34	2,361	5,154	263	11,390	23,003	212	26,400	80,236	921	47,919	111,668
	Truck and Full Trailer Combinations	29	1,151	4,434	19	1,222	4,293	165	5,744	17,940	92	9,030	49,122	592	20,523	73,389
All Rated Capacities	All Trucks, Truck & Trailer Combinations & Buses	1,432	$ 19,395	$ 73,457	563	$ 12,410	$ 43,947	11,932	$122,186	$380,547	1,524	$85,622	$339,076	53,790	$490,656	$992,804

The tables show that those units which travel less than 10,000 miles per year will pay at a rate approaching that in effect with respect to passenger cars. As a matter of fact these units will pay at a rate somewhat in excess of the rate for passenger cars. The results of the computation are so close, however, that we will say that contemporary taxing procedure is fair and equitable as regards the imposition of the Motor Vehicle License Tax on those units which will travel less than 10,000 miles per year. On reference to Table 94C, we find that there are 40,334 motor trucks, trucks involving combinations and buses which will travel less than 10,000 miles per year: these units, it is estimated will have paid $282,848 leaving a total of $709,956 to be paid by the remaining 13,456 units if, as set forth herebefore, we were to levy a special use tax so that costs for all trucks and buses would be equivalent to those in effect with passenger cars. It is to be noted that these 13,456 units will have paid $207,808 ($490,656 - $282,848) as a circumstance of the motor vehicle license tax leaving $502,148 to be raised by a special tax in the interest of equalization. If and when such a tax is levied, we will have a truly just and equitable taxing procedure, the effect of which will be to equalize the ton mile license tax cost for all road users, passenger car owners as well as truck and bus operators.

With respect to the incidence of a special tax in the interest of equalization we find that there will be 8,571 (22.4%) rural owned trucks and buses subject to the tax and 4,894 (31.4%) urban owned trucks and buses.

This discussion will not proceed to devise or design a special use tax in the interest of equalization. Suffice to say there is need for such a tax because, as shown in Chapter XII, it is estimated that road costs on the Federal Aid System and the State Secondary System will exceed revenues by $641,473. A good share of this deficiency, over $500,000, could then derive from a use tax levied in the interest of the equalization of license costs between passenger cars and trucks and buses. The tax as proposed would have no adverse effect with the great mass of private truck owners since these owners do not as a rule drive to exceed 10,000 miles per year.

Repeating the essence of previous discussion, we may say that there is the probability of a shortage in road funds for the construction of the Federal Aid and Secondary System in 1950; a good share of this estimated deficiency may be derived from a special use tax which is not a punitive measure against any class of vehicles or vehicle owners but rather a tax devised to provide equality in the cost for the privilege of using our road system. As to the balance of the deficiency, $141,473 ($641,473 - $500,000) it is believed that this money should come from additional grants in aid from the Federal Government, since our roads, even in far western Montana enter more and more into the national highway picture as it relates to interstate traffic and commerce.

13.04--Summary of Conclusions

This chapter has suggested the need for the imposition of a special use tax in the interest of equalization of motor vehicle imposts between passenger car owners and truck and bus owners. There are those in the latter classification who will object to the imposition of such a tax, particularly those who are engaged in the business of hauling as common carriers or contract haulers. Their objection will be grounded on the proposition that they are already paying such a tax to the Railroad and Public Service Commission, it is to be remembered, however, that the revenues originating with Motor Carrier Fees do not enter into the picture of highway finance in this state. These funds accrue in part to offset the administrative costs attaching to the regulation and control of the business of transportation in Montana. Other lines of business pay a license tax to operate in the state, hence it is felt that the imposition of this license tax levy on motor carriers is justified in principle. As to whether or not these carriers pay too much or too little for their permits to enter into and operate in the business of highway transport, we are not prepared to state. The Motor Carriers Fees as now imposed have no part or place in the picture of highway finance as regards the building and the care and up-keep of our highway systems.

For the purpose of clarifying the issues set forth in this chapter we present the following data in summary.

(1) The Montana Gasoline License Tax is fair and equitable since the revenues originating with the levy are generated in accord with road use in terms of vehicle mileage.

(2) There is need for an adjustment of the "Service charge" represented by the motor vehicle license tax, in the interest of equalization of motor vehicle imposts between passenger cars and trucks and buses.

(3) The imposition of a "Use" tax such as that suggested above would make up a major part of an expected deficiency in road revenues presuming the state launches on a program of road construction such as that outlined in Chapter IX and discussed in Chapter XII.

(4) The imposition of a "use" tax such as that suggested, having the effect of raising the motor vehicle license tax as a whole for trucks and buses would not raise the rates beyond those in effect in other states which are similarly circumstanced as regards procedure in taxation. For example, we find the average registration fee for trucks and buses in Arizona to be $17.67, in Idaho the fee is $22.48, and in Oregon, the average fee is $18.66; in accord with the estimated revenue set forth in this Chapter, the average motor vehicle license tax on all trucks and buses in Montana will be $18.45 as of 1950 instead of the average fee at present of $7.71.

GENERAL INDEX

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